TO EVALUATE AND FIND RELATIONSHIP AMONG EXECUTIVE FUNCTIONING, COPING STRATEGIES AND CLINICAL CORRELATES IN PATIENTS WITH MIGRAINE

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TANYA SHARMA

SUPERVISOR

DR.BHOLESHWAR PRASAD MISHRA

DEPARTMENT OF CLINICAL PSYCHOLOGY

DAYANAND MEDICAL COLLEGE AND HOSPITAL

LUDHIANA

(MAY 2021)

DECLARATION

I declare that the dissertation entitled **"To evaluate and find relationship among executive functioning, coping strategies and clinical correlates in patients with Migraine"** has been prepared by me under the guidance of **Dr. Bholeshwar Prasad Mishra**, Professor& Head, Department of Clinical Psychology,Dayanand Medical College and Hospital, Ludhiana. No part of this dissertation has formed the basis for the award of any degree previously.

_____

Tanya Sharma
Department of Clinical Psychology
Dayanand Medical College and Hospital
Ludhiana, Punjab

CERTIFICATE

I certify that **Tanya Sharma** has prepared the dissertation entitled **"To evaluate and find relationship among executive functioning, coping strategies and clinical correlates in patients with migraine"** for the award of **M. Phil Degree** of Baba Farid University of Health Sciences, Faridkot. She has carried out the work at the Department of Clinical Psychology, Dayanand Medical College & Hospital, Ludhiana

The data collected in this dissertation is genuine and the work has been carried out by the candidate herself.

Supervisor

Dr. Bholeshwar Prasad Mishra
Professor& Head
Department of Clinical Psychology,
DMC&H, Ludhiana

Co-Supervisor

Dr. Rajinder Bansal
Professor,
Department of Neurology
DMC&H, Ludhiana

Co-Supervisor

Ms. Palak Upadhyay,
Assistant Professor,
Deptt. of Clinical psychology,
DMC&H, Ludhiana

Date:

ENDORSEMENT BY THE HEAD OF DEPARTMENT AND PRINCIPAL

This is to certify that dissertation entitled **"To evaluate and find relationship among executive functioning, coping strategies and clinical correlates in patients with migraine"** is a bonafide research work done by **Tanya Sharma** under the guidance of **Dr. Bholeshwar Prasad Mishra,** Professor& Head, Department of Clinical Psychology, Dayanand Medical College & Hospital, Ludhiana.

Head of Department **Principal**

Dr. Bholeshwar Prasad Mishra
Professor & Head
Department of Clinical Psychology
DMC&H, Ludhiana

Dr. Sandeep Puri
Principal
DMC&H, Ludhiana

Date:

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Tanya Sharma
Department of Clinical Psychology
Dayanand Medical College and Hospital,
Ludhiana, Punjab.

Date:

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ABSTRACT

Introduction: Migraine is a common primary headache due to a genetic predisposition of episodic activation and sensitization of the trigeminovascular pain pathway. Studies also revealed that executive dysfunction in migraine patients tends to affect their academic, occupational functioning, and also the overall quality of life. Along with impaired executive performance the migraneurs use maladaptive coping styles. Coping is defined as the process of executing a response to a stressor. Studies also suggested that persistent difficulty in coping was a risk factor for recurrent relapses in migraine patients. Psychological distress has also been reported to be high among patients with chronic migraine. Researches indicates the presence of psychological distress, leads to cognitive dysfunction.

Aim of Study: 1.To evaluate and find relationship among executive functioning, coping strategies and clinical correlates in patients with migraine. 2. To compare executive functioning, coping strategies and clinical correlates in patient with migraine and control group.

Materials & methods: The study was conducted on patients with migraine presenting to DMC& Hospital and without migraine (control group) residing in Ludhiana, evaluation was done using Executive functioning test (Trail making test-A & B, Stroop color word test, Digit span test, Clock Drawing test, Brief-Cope questionnaire and clinical correlates (HAD-S). Statistical analysis was performed using, Chi-square and Pearson's correlation tests on SPSS version 21.0

Results: Patients showed significantly poor performance on executive functioning test compared to control. Migraine patients employed maladaptive coping strategies and have higher psychological distress compared to control. Significant associations were found in age, duration of illness and frequency of attack in patients with migraine. The findings suggested that there is an association between poor executive functioning, maladaptive coping strategies with high level of psychological distress.

Conclusion: Executive functioning, coping strategies and clinical correlates are an important area of study in migraine. The goal of assessing these domains is that the individuals could receive appropriate cognitive stage and have the best opportunity to recover. The findings of the present study indicate that there is a significant correlation among executive functioning, coping strategies and clinical correlates. These domains could be potential target for cognitive training and therapeutic intervention. The improvements in these domains may lead to a better daily functioning in patients suffering from migraine

Clinical Significance: The significance of the present study lies in the fact that patients with migraine shows impairment in executive functioning, maladaptive coping strategies and psychological distress. Effective cognitive training and therapeutic package would help in overall recovery.

Keywords: Migraine, Executive functioning, Coping strategies, Clinical correlates.

ABBREVIATIONS

BDI	Beck Depression Inventory
CF	Cognitive Flexibility
CDH	Chronic Daily Headache
CDT	Clock Drawing Test
CM	Chronic Migraine
COPE	Coping Orientation to Problem Experienced
CW	Color Word
DST	Digit Span Test
EF	Executive Functioning
GM	Grey Matter
GAMS	Global Assessment of Migraine Severity
HC	Healthy Control
HADS	Hospital Anxiety Depression Scale
ICHD-3	International Classification of Headache Disorder
MwoA	Migraine without Aura
MwA	Migraine with Aura
MMSE	Mini Mental Status Examination
SD	Standard deviation
SPSS	Statistical Package for Social Sciences
TMT-A	Trail Making Test-A
TMT-B	Trail Making Test-B
TTH	Tension Type Headache
VBM	Voxel-Based-Morphometry
WM	Working Memory

KEYS TO MASTER CHART

CO-WO	Color Word
CDT	Clock Drawing Test
DOI	Duration of Illness
DST	Digit Span Test
EDU	Education
HAD-S	Hospital Anxiety Depression Scale
TMT	Trail Making Test

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INTRODUCTION

MIGRAINE:

Migraine is the leading cause of neurological disability in the world. Around 15-20% of the general population develops migraine during their lifetime. It is the most common headache diagnosis for which patients seeks treatment. It is not just a physical experience but it has a range of consequences to other areas of life. Due to which patients presented with some or total limitations of normal daily activities. Stress is accepted as a primary precipitant of muscle contraction headache. Recently it got acknowledged as a major precipitator of migraine headaches. Patient's usually presented with cognitive complaints and difficulty to cope with problems. Therefore, it is important for us to assess their executive functioning and coping strategies employed by them. So that we can reinforce the fact that management of migraine is more than only control groupling the pain.

Migraine is a common, chronic, intermittently disabling, and usually inherited neurovascular disorder. Patients with this condition typically suffer from severe headache accompanied by autonomic symptoms. It is the second most common cause of headache, afflicts approximately 15% of women and 6% of men over a 1-year period. It is usually an episodic headache associated with certain features such as sensitivity to light, sound, or movement; nausea and vomiting often accompany the headache.(Hauser, S.L.,2006) [1].

According to ICHD-3[2] migraine is a common disabling primary headache disorder. A lot of epidemiological studies has been documented showing its high prevalence and has impact on personal as well as socio-economic. In the Global Burden of Disease Study (2010) [3], it was ranked as the third most prevalent disorder in the world. In 2015, GBD, migraine was ranked as a third–highest cause of disability all around the world in both the gender under the age of 50 years.

Migraine has two major types:

1.1 Migraine without aura is a clinical syndrome characterized by headache with specific features and associated symptoms.

1.2 Migraine with aura is primarily characterized by the transient focal neurological symptoms that usually precede or sometimes accompany the headache. Typical characteristics of the headache are unilateral in location, pulsating in quality, moderate to severe in intensity, aggravated by routine physical activity and association with nausea and/or photophobia and phonophobia.

Diagnostic criteria:

A. At least five attacks fulfilling criteria B-D

B. Headache attacks lasting 4-72hr (untreated or unsuccessfully treated)

C. Headache has at least two of the following four characteristics:

1. unilateral location
2. pulsating quality
3. moderate or severe pain intensity
4. aggravation by or causing avoidance of routine physical activity (eg, walking or climbing stairs)

D. During headache at least one of the following:

1. nausea and/or vomiting
2. photophobia and phonophobia

E. Not better accounted for by another ICHD-3 diagnosis.

F. Description: Recurrent attacks, lasting minutes, of unilateral fully-reversible visual, sensory or other central nervous system symptoms that usually develop gradually and are usually followed by headache and associated migraine symptoms.

Diagnostic criteria:

A. At least two attacks fulfilling criteria B and C

B. One or more of the following fully reversible aura symptoms:

1. visual
2. sensory
3. speech and/or language

4. motor
5. brainstem
6. retinal

C. At least three of the following six characteristics:

1. at least one aura symptom spreads gradually over ≥5 minutes
2. two or more aura symptoms occur in succession
3. each individual aura symptom lasts 5-60 minutes
4. at least one aura symptom is unilateral
5. at least one aura symptom is positive
6. the aura is accompanied, or followed within 60 minutes, by headache

D. Not better accounted for by another ICHD-3 diagnosis.

Migraine is a recurring syndrome of headache associated with other symptoms of neurologic dysfunction in varying admixtures. Migraine can often be recognized by its activators, referred to as triggers. The brain of the migraineur[4] is particularly sensitive to environmental and sensory stimuli; migraine-prone patients do not habituate easily to sensory stimuli. This sensitivity is amplified in females during the menstrual cycle. Headache can be initiated or amplified by various triggers[5,6,7], including glare, bright lights, sounds, or other afferent stimulation; hunger[8]; let-down from stress; physical exertion; stormy weather or barometric pressure changes; hormonal fluctuations during menses; lack of or excess sleep; and alcohol or other chemical stimulation, such as with nitrates. Knowledge of a patient's susceptibility to specific triggers can be useful in management strategies involving lifestyle adjustments.

Few researches shows that migraineur shows reduced frontal lobe GM density and diffusion abnormalities in migraineurs. Such evidence shows abnormalities of frontal lobe in migraine and neuro-functionally, frontal lobe abnormalities are associated with EF deficits. [9]

EXECUTIVE FUNCTIONING:

Executive functions is a complex, higher order processes which is moderated primarily by the frontal lobe, specifically the prefrontal cortex. There is a complexity of executive function which has made a universally accepted definition very elusive, but attention (focusing on relevant information and ignoring distractors), working memory (maintaining and manipulating information until execution), and motor planning (goal-directed motor planning and programming) are generally considered as a main key of executive functions.[10]

Executive functions (EFs; also called executive control group or cognitive control group) refer to a family of top-down mental processes needed when you have to concentrate and pay attention, when going on automatic or relying on instinct or intuition would be ill-advised, insufficient, or impossible [11-13]

There are subdomains of EF which act coherently to successfully implement cognitive flexibility. A constant changing environment, individuals must first identify how surroundings have changed by directing attention to those elements that are in flux. After discovering that a previous strategy is not suitable in the new environment, individuals must interdict previous responses and reorgainse a new strategy. Individuals take in information and manipulate it in real time to flexibly switch responses from one scenario to another. Cognitive flexibility is not merely the sum of implementing various EFs, but also requires shifting, or the reconfiguration of one's response set to the new goal. Cognitive flexibility is the ability to appropriately adjust one's behavior according to a changing environment.[14,15] CF enables an individual to work efficiently to disengage from a previous task, reconfigure a new response set, and implement this new response set to the task at hand. Greater cognitive flexibility is associated with favorable outcomes throughout the lifespan higher resilience to negative life events and stress in adulthood[16]

Inhibition or inhibitory control group is the ability to inhibit or control group impulsive (or automatic) responses, and create responses by using attention and reasoning. This cognitive ability is one of our executive functions and contributes to anticipation, planning, and goal setting. Inhibition or inhibitory control group blocks behaviors and stops inappropriate automatic reactions, changing one response for a better, more thought-out response adapted to the situation.[17]

Working memory is the system by which information is maintained in an active mental state during the course of processing so that it can be used for other purposes. It is this system that allows us, for instance, to understand a lengthy sentence or to retain a phone number long enough to run to the telephone and dial it. The working memory system is intimately related to various aspects of executive function: information must remain in an active state so that it is accessible for use in higher-order behaviors, such as planning and organizing, decision making, and problem solving.

It is one of the brain's executive functions that provides with an ability to hold on to new information so we can turn around and use it in some way. WM allows us to hold information without losing track of what we're doing. Cognitive measures of WM capacity reflect an individual's capacity to maintain information, including task goals, in a highly active state despite interference. They suggest that keeping relevant information highly active and easily accessible reflects an individual's ability to control group attention, because "coherent and goal-oriented behaviour in interference-rich conditions requires both the active maintenance of relevant information and the blocking or inhibiting of irrelevant information"[18]

In the digit span task, the patient repeats progressively longer number sequences in the forward or the reverse direction. Although digit span is affected by both age and education, typical adult performance is about seven digits forward with a reverse span that does not differ by more than two digits.[19]

Planning is often needed to help optimize the execution of complex tasks. Patients with impaired planning may exhibit difficulty developing a flexible plan appropriate to the circumstances, initiating the plan, carrying out a series of steps in the correct order, maximizing efficiency and time management, adjusting the plan in real time, and completing the series of actions.[20]

COPING STRATEGIES:

Coping is defined as the process of executing a response to a stressor, where stress is viewed as the experience of encountering relevant difficulties in one's goal-related efforts [21] and exists when an individual perceives the achievement of a desired goal as impossible or detects possible future punishments.[22] Thus, coping has been described as an individual's attempt to use cognitive and behavioural strategies to manage and regulate pressures, demands, and emotions in response to stress.[23]

Coping has been defined as a special category of adaptation elicited in normal individuals by unusually taxing circumstances.[24] The most influential model of psychological stress response is the one proposed by Lazarus and Folkman[25]

The process of coping was defined as constantly changing cognitive and behavioural efforts which are undertaken by an individual in order to deal with demands which are especially challenging and are probably exceeding individual capacities and/or resources[25]. The process of coping involves three main elements: the source of the stress (the event or stressor); cognitive appraisal (which includes evaluation of the event as being irrelevant, threatening or positive, and simultaneous assessment of available coping resources within the individuals and their environment); and coping mechanisms.

Coping behaviours and strategies have been traditionally dichotomized into categories, such as problem- versus emotion-focused, functional versus dysfunctional, approach versus avoidance, engagement versus disengagement, and primary versus secondary control group coping.

Lazarus and Folkman's method of categorizing coping behaviours into problem-focused or emotion-focused is the most famous and used one to study coping. Some behaviours, such as planned problem-solving, can be labeled problem-focused coping and referred to actions aimed to eliminate the stress factor or reduce its impact.

On the other hand, behaviors such as distancing, self-control groupling, accepting responsibility, escape/avoidance, and positive reappraisal can be categorized as emotion-focused coping which alludes to actions aimed to prevent, minimize, or reduce the emotional anguish caused by the stressful situation. Theorist [26] suggested adding a third set of strategies denominated avoidant strategies, which are focused on avoiding stressful situations by seeking the company of others or by engaging in different activities.

Several scales have been designed in order to measure coping strategies. Carver (1997) presented an abbreviated Version of COPE, the Brief-COPE, which has been widely used in health contexts.[27]

This instrument has 14 subscales composed of 2 items each: (a) acceptance (b) emotional support ;(c) humor; (d) positive reframing; (e) religion; (f) active coping; (g) instrumental support; (h) planning; (i) behavioral disengagement; (j) denial; (k) self-distraction; (l) self-blaming; (m) substance use; (n) venting is saying things to let unpleasant feelings escape/expressing negative feelings.

(a) acceptance is accepting the reality that has happened/learning to live with it; (b) emotional support is obtaining emotional support/comfort and understanding; (c) humor is making jokes about it/making fun on the situation; (d) positive reframing is trying to see the situation from a different light, make it seem more positive/look for something good in it; (e) religion is finding comfort in religious or spiritual beliefs/praying or meditating; (f) active coping is concentrating the efforts on doing something about the situation/taking action to try to make it better; (g) instrumental support is getting help and advice from other people/trying to get advice or help from others about what to do; (h) planning is trying

to come up with a strategy about what to do/thinking hard about what steps to take; (i) behavioral disengagement is giving up trying to deal with it/the attempt to cope; (j) denial is saying to myself “this is not real”/refusing to believe that it has happened; (k) self-distraction is turning to work or other activities to take my mind off things/doing something to think about it less; (l) self-blaming is criticizing myself/blaming myself for things that happened; (m) substance use is using alcohol or other drugs to feel better/to help me get through it; (n) venting is saying things to let unpleasant feelings escape/expressing negative feelings.

Carver, categorizes the strategies of acceptance, emotional social support, humor, positive reframing, and religion as emotion focused. On the other hand, active coping, instrumental support, and planning are considered as problem-focused strategies. Finally, behavioral disengagement, denial, self-distraction, self-blaming, and substance use and venting are considered as dysfunctional coping strategies.

RELATIONSHIP BETWEEN EXECUTIVE FUNCTIONING AND COPING STRATEGIES:

Coping may recruit multiple executive function components, particularly working memory, planning, sequencing, cognitive flexibility and inhibitory control group.[28]For example, coping effectively with a stressor may involve holding prior encounters with similar stressors in mind (i.e., working memory) while evaluating coping alternatives and adjusting cognitive and behavioral responses (i.e., cognitive flexibility).[29]Hence, an individual’s capacity to select and implement coping strategies that forestall the onset of depression may be affected by the executive function components that subserve these strategies.

Relative strengths or weaknesses in particular executive functions may either enhance or interfere with the selection and effective implementation of coping strategies, and thereby impact psychological adjustment.[30] That is, these executive function components could

facilitate adaptive coping, exacerbate maladaptive coping, or mitigate against the harmful effects of maladaptive coping.

CLINICAL CORRELATES:

The scope and impact of depression and anxiety disorders worldwide are overwhelming. The watershed Global Burden of Disease (GBD) study found that major depression ranked fourth among all medical illnesses in terms of its disabling impact on the world population.[31,32]

Depression and anxiety disorders are among the most common illnesses in the community and in primary care. Patients with depression often have features of anxiety disorders, and those with anxiety disorders commonly also have depression. Both disorders may occur together, meeting criteria for both. It can be difficult to discriminate between them but it is important to identify and treat both illnesses, as they are associated with significant morbidity and mortality. General practitioners are well placed to identify and take a primary role in treatment of these illnesses, to facilitate better mental health outcomes.[33]

Patients who have depression and anxiety comorbidity have higher severity of illness, higher chronicity, and significantly greater impairment in work functioning, psychosocial functioning, and quality of life than patients not suffering from comorbidity.[34,35,36,37]

Comorbid depression and anxiety can increase impairment and health care use, compared with either disorder alone. Their co-occurrence is often associated with a poor prognosis and significant detrimental impact on functioning in the workplace. The number and severity of anxiety symptoms, rather than the specific anxiety diagnosis, correlate strongly with the persistence of subsequent depressive symptoms, and this relationship is stable over decades.[38]

RELATIONSHIP BETWEEN MIGRAINE AND EXECUTIVE FUNCTIONING:

Migraineur shows reduced frontal lobe GM density and diffusion abnormalities in migraineurs. There is, however, increasing evidence of

frontal lobe abnormalities in migraine[39,40,41], and neuro-functionally, frontal lobe abnormalities are associated with EF deficits [42].

The inferior parietal lobe monitors selective attention, and the superior parietal region is responsible for task-switching, set-shifting and integration of information[39] Neuroanatomically, a network of fronto-striatal-parietal brain regions is responsible for monitoring executive functioning. Executive functioning's are a subset of cognitive functions, which enable us to demonstrate goal-directed behavior, usually in novel contexts with competing response alternatives.[43] However, the neurobiological and pathological processes underlying the disorder are unclear, and little is know about the relationship between brain structure and cognitive impairments in migraineurs.

Several investigations have addressed the possibility that subtle cognitive deficits might be associated with migraine. However despite the substantial burden that migraine places upon the society, the number neuropsychological investigations addressing in migraine is relatively less.

RELATION BETWEEN MIGRAINE AND COPING STRATEGIES:

In the last years, a relationship between recurrence of migraine episodes and maladaptive coping styles has been suggested, but this issue has been poorly investigated. Migraine sufferers were characterized by pronounced psychological abnormalities during the headache phase, demonstrating a larger use of maladaptive coping behaviour in migraineurs than in patients with TTH [44]. Other observations suggested that migraine patients are prone to use internally focused coping strategies such as nonverbal complaints, suppressive thoughts, and decreased search for social support suggesting a contracted attitude toward affective support coming from other people [44,45]

RELATION BETWEEN MIGRAINE AND CLINICAL CORRELATES: DEPRESSION AND ANXIETY:

Both migraine and psychiatric disorders are prevalent and burdensome conditions challenging the health care systems worldwide [46-50]. These conditions show a large overlap[51,52] and epidemiological studies suggest that patients with migraine – especially those with chronic migraine (CM) and migraine with aura – are at increased risk for major depression, anxiety.

Similar to other pain conditions, it is reasonable to assume that a diagnosis of migraine might lead to increased worrying and vulnerability to pain, anxiety, dysphoria and a higher risk of depression. Understanding the nature of relation between migraine and depression or anxiety could improve our understanding of the etiology of these conditions and influence the choice of treatment. Psychiatric comorbidity in migraine was found to exacerbate the impact of the illness and substantially increase the associated medical expenses. Migraine itself is a polygenetic disorder; however, it has an influence of environmental factors that may determine the frequency, duration, and chronification of pain. The predisposition to psychiatric comorbidities may play a role. There are many studies that have found a relationship between migraine and anxiety/depression.[53-55]

However, there is a dearth of research studying the impact of executive functions on coping strategies, especially in migraine, and how effective those strategies are in decreasing negative psychological outcomes.

AIMS & OBJECTIVES

To study the executive functioning, coping and clinical correlates among patients with migraine and without migraine (control group group)

1) To study the different coping strategies utilized by patients with migraine and without migraine
2) To evaluate executive functioning in patients with migraine and without migraine.
3) To assess clinical correlates in patients with migraine and without migraine.
4) To assess a relation between executive function and coping strategies in patients with migraine and without migraine.
5) To compare executive functioning, coping strategies and clinical correlates in patients with migraine and without migraine.

REVIEW OF LITERATURE

A study was conducted by William et al[56].,1986 where a neuropsychologic test battery was administered to 16 outpatients with classic migraine and 15 outpatients with common migraine between attacks and 15 matched non-headache volunteers. Both migraine groups demonstrated significantly greater average neuropsychologic impairment and more self-reported cognitive difficulties than the non-headache control group. Both classic and common migrainous disorders seem to involve a disturbance of cerebral function beyond the attack itself.

A study held by Burker et al., 1989[57] examined the theory that chronic migraine headaches can lead to permanent changes in brain function in 71 female college student found no significant group differences on the Halstead Reitan Neuropsychological Test Battery and additional memory tests. Classic migraineurs had significantly higher scores than common migraineurs on the Hysteria and Paranoia scales of the Minnesota Multiphasic Personality Inventory (MMPI) and significantly higher scores than the control groups on Hypochondriasis and Hysteria scales.

A study conducted by Siniatchkin et al.,1999[58] evaluated migraine patients on Emotional, cognitive, and behavioral pain coping by using the Kiel Pain Inventory (KPI), Beck's Depression Inventory, the State-Trait-Anxiety Inventory, and Quality of Life Questionnaire. The results showed that the KPI is reliable internally for the assessment of pain-coping strategy employment among headache patients. Patients with migraine were characterized by pronounced psychological abnormalities during the headache phase, demonstrating a less adaptive coping behaviour which was in contrast to the TTH patients, as they showed more general distress manifesting in elevated anxiety and poor quality of life. The only essential factor for differentiating between migraine and TTH was the intensity of headache. Chronic TTH and CDH evolved from migraine demonstrated more pronounced

psychological disabilities and more severe clinical courses of headaches than episodic TTH or non- transformed migraine. The predictor variable for transformation of migraine was impairment of well-being/quality of life, and for transformation of TTH, the frequency of headaches and depression.

A study by Waldie et al., 2002[59] investigated the association between migraine and cognitive ability among members of a longitudinal birth cohort study found members diagnosed with migraine were subtly but significantly impaired, compared with those with TTH and headache-free control group subjects, on tests of verbal ability (especially language reception). Performance on other tasks, including reading, arithmetic, motor, and spatial ability, was normal. The association between migraine and verbal functioning also appeared to impact on later academic success.

A population based study held by Gaist et al.,2005[60] investigated the cognitive functioning of migraineurs vs non-migraineurs. They were evaluated on cognitive tests and two previously validated questions screening for migraine found that average scores on cognitive tests in twins with migraine or one of the migraine subtypes did not differ from those of non-migraineurs in any of the tests.

Study by Mongini et al., 2005[61] examined whether similar functional differences would be found in patients with chronic migraine. The Gambling Task (GT), the Tower of Hanoi-3 (TOH-3) and the Object Alternation Test (OAT) were administered to 23 female patients previously treated for chronic migraine and to 23 healthy women who were similar to the patients in age and educational level. The patient group scored significantly higher than the control groups on the TOH-3 and, especially, the OAT. In the patients, no significant relationship was found between the neuropsychological test scores and those for the Minnesota Multiple Personality Inventory (MMPI), the Spielberg State-Trait Anxiety Inventory (STAI), and the Beck Depression Inventory (BDI). In conclusion, the data suggest a relation between chronic

headache and dorsolateral function (as tested by the TOH-3) and orbit frontal function (as tested by the OAT). The decision-making function related to ventromedial prefrontal cortex (tested by the GT) did not show a statistically significant difference between patients and control groups. These neuropsychological findings seem to be partly independent of the patient's psychological traits and psychiatric disorders.

A cross-sectional study conducted by Camarda et al[62]., 2007 in patients with migraine without aura (MwA) to assess whether it is associated with impairment in executive functioning, a typical cognitive correlate of subcortical WML. Forty-five subjects with MwA and 90 control groups, matched for age and education, underwent a cognitive battery of tests evaluating executive functions. The following migraine characteristics were collected: age at onset and length of migraine history, and frequency, duration and intensity of attacks. The results showed that subjects with MwA performed significantly lower than control groups in tests evaluating complex, multifactorial executive functions. In the interictal phase of MwA there is evidence of mild executive dysfunction. The cumulative effects of repeated migraine attacks on prefronto-cerebellar loop probably account for their results.

A longitudinal and cross-sectional relationship between migraine headaches and cognitive functioning was examined by Kalaydijan et al., 2007[63]. The data were from Waves III (1993 through 1996) and IV (2004 through 2005) of the Baltimore Epidemiologic Catchment Area Study. Migraine headaches were diagnosed according to modified criteria of the International Headache Society. Scores on the immediate and delayed recall tests and the Mini-Mental State Examination (MMSE) were compared for migraineurs (n = 204) vs non-migraineurs (n = 1,244). The longitudinal association between migraine and cognitive changes was assessed by generalized estimating equations. The results showed that migraineurs scored lower on tests of immediate and delayed memory at baseline, but declined by less over time than non-migraineurs. These associations were specific to

migraineurs with aura, who declined by 1.26 ($p < 0.01$) and 1.47 ($p < 0.01$) words less on the immediate and delayed recall tests over the 12 years of follow-up. The effects of migraine, specifically with aura, on the MMSE were restricted to those older than 50 years. Among those younger than 50 years, migraineurs with aura declined at the same rate on the MMSE as non-migraineurs. However, among those older than 50 years, migraineurs with aura declined by 0.99 points ($p < 0.01$) less over the follow-up.

To assess the executive functioning and cortex structure in patients with migraine and control group subjects a study was conducted by Schmitz et al[64]., 2008.The investigations highlighted frontal lobe related cognitive impairments in migraineurs, including working memory and executive function deficits. Thus, they assessed grey matter (GM) density in 25 adult patients with migraine, compared to age and sex-matched control group subjects, using magnetic resonance imaging (MRI) and (VBM), and measured EF in the same population, employing three EF tasks of the Maudsley attention and response suppression (MARS) battery. Migraineurs, compared to control group subjects, showed decreased frontal and parietal lobe GM density and slower response time to task set-shifting and, the delayed response time correlated significantly with reduced GM density of the frontal lobes in migraineurs. Frontal and parietal lobe abnormalities in migraineurs could be an underlying cause of significantly slower response time during cognitive set-shifting.

A study held by Gunel et al., 2008 [65]aimed to investigate the differences between a sample of migraineurs and non-migraineurs with regard to their stress symptoms, tendency to stress, coping styles and life satisfaction by using Stress Audit (Symptoms), Stress Audit (Vulnerability), Turkish version of Ways of Coping Inventory Scales and Life Satisfaction. The study found no significant differences between the groups in the scores of the stress symptoms except in the sub scores of the sympathetic system. There was no significant difference between the groups in the tendency to stress and life satisfaction (p

>.05). For scores of the coping styles, the mean scores of the seeking social support subscale was higher in the control group than that of the migraineur group. However, migraineur women had higher mean scores in the submissive and the optimistic subscales.

A prospective cohort study by Rist et al., 2011[66] was held on migraine patients who provided information about migraine status and completed cognitive testing. Cognitive functioning was measured at up to four time points using nine different cognitive functioning tests. Linear mixed effects models were used to evaluate the relationship between migraine status and change in cognitive function found 1170 participants, 938 had no severe headache, 167 had migraine, and 65 had non-migraine headache. After adjusting for age, gender, education and smoking status, people with migraine or non-migraine headache did not experience a greater rate of cognitive decline than those without headache or migraine in any domain (for the Mini Mental State Examination (MMSE), p-values were 0.68 for the non-migraine headache and time interaction and 0.85 for the migraine and time interaction) during 4-5 years of follow-up.

A systematic review held by De Araújo et al., 2012 [67] observed that all of the clinical studies show poor cognitive performance during migraine attacks, though, the interictal data are conflicting. Migraineurs show impaired cognitive function interictally in most of the clinic-based studies. Population-based studies did not reveal a difference in cognitive functions between migraineurs and control groups. The specific cognitive domains involved are information processing speed, basic attention, executive functions, verbal and non-verbal memory and verbal skills. Neurophysiological, imaging and pharmacological studies support clinical symptoms of cognitive impairment in migraine. Longitudinal studies do not suggest progressive cognitive decline over time in migraine patients. Preventive medications and comorbid disorders such as depression and anxiety can impact cognitive function, but cannot fully explain the cognitive impairment in migraine. In contrast to migraine, tension type or cluster headache are not

associated with cognitive impairment, at least during headache-free periods.

A systematic reviewed stud by Suhr et al., 2012 [68] on examining the neuropsychological performance in migraine found there is a weak evidence for deficits in processing speed, attention, verbal memory, verbal skills, working memory, sustained attention, and inhibition in migraine relative to healthy control groups. There are mixed results regarding deficits in visual memory, motor dexterity, visuospatial/ constructional skills, visual reasoning, and mental flexibility in migraine relative to healthy control groups

A cross-sectional observational study by Isabel et al[69]., 2012 took place in primary care, adults were evaluated by a neurobehavioral battery including several executive measures. Migraine was diagnosed by the ID-Migraine questionnaire. The effect of headache type on cognitive measures was analyzed with multiple regression with adjustment by diagnosis, age, gender, education, and depressive symptoms. The results suggested among 478 participants, 23.2% reported current headache, of whom 50 were NMH, and 61 were migraine headaches. No group differences were found in the majority of cognitive measures. Compared with control groups, migraine subjects performed worse on a test of attention, while NMH participants presented more intrusions and worse discriminability in memory recognition plus a lower performance on semantic memory tests.

A Prospective cohort study held by Rist et al., 2013 [70] to evaluate the association between migraine and incident depression. Cox proportional hazards models were used to evaluate the association between migraine and headache status and incident depression found middle-aged women with migraine or non-migraine headache are at increased risk of incident depression. Frequent migraine attacks (weekly or daily) were associated with the highest risk for developing depression.

Another study by De Tommaso et al., 2014 [71] aimed to Fibromyalgia syndrome (FM) is frequently associated with migraine. In this study we aimed to compare personality profiles and coping styles across 23 migraine without aura patients sharing FM comorbidity (MWA-FM), 28 migraine without aura patients without FM symptoms (MWA) and 51 age- and sex-matched control groups, by means of Big Five Questionnaire (BFQ) and Coping Orientation to Problem Experienced (COPE), and to correlate main results with clinical features. The “Energy” personality factor was significantly reduced in patients presenting with FM symptoms, compared to both migraine without aura patients and control groups. A low score in “Dynamism” sub-item with a high score in denial coping style was able to distinguish MwA from MW-FM groups with an accuracy of 82.35% (Wilks lambda = 0.98; chi-square = 8.99, DF = 1, p = 0.005). In particular, lower “Dynamism” scores corresponded to a major expression of allodynia, fatigue, anxiety, depression, headache frequency and poor quality of sleep and life.

A retrospective analysis was done by Biagianti et al., 2014 [72] investigated whether personality traits, dependency-like behaviors and pain coping styles predicted those who relapsed into medication overuse within the 12 months following the detoxification and those who did not. Patients were assessed for personality traits, mood and anxiety, pain coping styles and dependency-like behaviors prior-to and one year after a detoxification program. The results revealed of the 42 subjects who attended 1-year follow-up interviews, 11 relapsed into medication overuse despite a temporary benefit from detoxification and did not show clinical or psychological improvement, instead reporting increased anxiety and unmodified perpetuation of severe dependency-like behaviors. In contrast, subjects who did not relapse into medication overuse had clinical improvements that generalized to untreated domains, including decreased depressive symptoms and dependency-like behaviors, although showing unmodified low internal control group over pain. The study believed that the persistence of maladaptive pain

coping strategies and residual symptomatology increase the risk for recurrent relapses.

A study held by Morries et al., 2015[73] examined relations among coping, executive functioning, and depressive symptom trajectories in a sample of remitted-depressed (n = 32) and never-depressed (n = 36) young adults (ages 18 to 31) the patients completed a clinical interview, a measure of coping, and tasks assessing two components of executive function - inhibition and cognitive flexibility found that among never-depressed individuals, less primary control group coping (e.g., problem solving) and greater disengagement coping (e.g., avoidance) predicted increases in depressive symptoms. Greater secondary control group coping (e.g., acceptance) predicted decreases in depressive symptoms and was unrelated to depression history. Higher inhibition scores predicted less increase in depressive symptoms for individuals reporting less primary control group coping or more disengagement coping. Higher cognitive flexibility scores predicted less increase in depressive symptoms among individuals reporting less secondary control group coping.

A study by Shaik et al.. 2015[74] aimed to measure QOL among migraine sufferers in comparison with healthy control groups were evaluated on Malay version of the World Health Organization QOL Brief (WHOQOL-BREF) questionnaire found that females with migraines had significantly lower total WHOQOL-BREF scores (84.3) than did healthy control groups (91.9, $P< 0.001$). Similarly, physical health (23.4 versus 27.7, $P< 0.001$) and psychological health scores (21.7 versus 23.2, $P< 0.001$) were significantly lower than those for healthy control groups. Seventy-three percent of patients experienced severe disability, with significantly higher number of days with headaches (13.8 days/3 months, $P< 0.001$) and pain scores (7.4, $P< 0.013$).

Gil et al., 2015[75] held a prospective two-period, randomized, cross-over study documented changes in cognitive performance of migraine

patients during migraine attacks with a comprehensive battery of cognitive/behavioral tests, while control group for potential confounders. The results stated that thirty-nine patients with episodic migraine (37 females, average 38 years old) were included and 24 completed the study. Participants performed worse during the attack in the majority of cognitive tests, compared to the headache-free status, and significantly so in word reading speed ($p = 0.013$), verbal learning ($p = 0.01$), short-term verbal recall with ($p = 0.01$) and without ($p = 0.013$) semantic cueing and delayed recall with ($p = 0.003$) and without ($p = 0.05$) semantic cues. Differences found were unrelated to age, gender, literacy, condition order, interval between evaluations, anxiety, pain intensity or duration of the attack.

A cross-sectional study done by Padilla et al., 2016[76] to identify differences in memory processes and the role of executive functions in memory, in people with migraine and in a control group were evaluated on neuropsychological testing in one session. The results revealed statistically significant differences between groups on Rey-Osterrieth direct and percentile copy strategy and recall (both $p < 0.001$). Differences were identified between control group and migraine groups in performance on the Rey-Osterrieth Complex Figure, but not on other memory tasks, suggesting the existence of brain dysfunctions in people with migraine affecting organizational and planning abilities that are necessary for visual memory.

Study by Costa et al, 2016[77] investigated cognitive performance of adolescents with migraine. Twenty-eight adolescents diagnosed with migraine and twenty-six individuals without a history of headache were recruited for the study where all participants were evaluated using standardized neuropsychological tests found that adolescents with migraine had worse performance on tests evaluating short- and long-term verbal memory, attention, executive function, and speed of processing information than control group.

A randomized, cross sectional study by Huang et al., 2017[78] evaluated the changes in the cognitive performance of migraine patients using a comprehensive series of cognitive/behavioural and electrophysiological tests found that migraineurs performed worse in the majority of the Montreal Cognitive Assessment (MoCA) ($p = 0.007$) compared to the healthy subjects, significantly in language ($p = 0.005$), memory ($p = 0.006$), executive functions ($p = 0.042$), calculation ($p = 0.018$) and orientation ($p = 0.012$). Migraineurs had a lower score on the memory trial of the Rey–Osterrieth complex figure test (ROCF) ($p = 0.012$) and analyzed significant correlations between MoCA score and the duration of migraine. Migraineurs were more anxious than healthy subjects ($p = 0.001$), which is independent of cognitive testing.

A study conducted by Letizia[79] et al., 2017 was to evaluate both the presence of anxiety and depressive symptoms in patients with Migraine(M) and Chronic Migraine(CM). Symptoms of depression and anxiety were measured using the Beck Depression and Anxiety Inventory. They showed that anxiety were significantly higher in the CM group than in the control group and depressive symptoms were more common in CM compared to the control group regarding the age of the subjects, in the M group there was a tendency for the patients over 36 years old having more symptoms of depression and the CM group had a significantly higher percentage of depressive symptoms in the younger patients compared with the control group.

A study held by Lee et al., 2017[80] investigated the presence and frequency of SCD and its relationship with anxiety, depression and sleep quality in patients with migraine. Those patients were enrolled who scored within the normal range of the Korean-Mini Mental State Examination and the Korean-Montreal Cognitive Assessment were further assessed on the Headache Impact Test-6, Generalized Anxiety Disorder-7, Patient Health Questionnaire-9, and Pittsburgh Sleep Quality Index. The results found migraineurs with SCD reported higher headache pain intensity and headache impact, as well as greater prevalence of anxiety, depression, reduced quality of sleep, and

shorter sleep duration during weekdays compared to migraineurs without SCD.

A study conducted by Ferreira et al., 2018[81] was aimed to assess the presence of cognitive deficits in patients with chronic migraine, and to assess the main factors that trigger cognitive disorders, such as comorbidities or the use of medications. All patients were submitted to an extended neuropsychological assessment. The results showed that the chronic migraine group (n = 30) had a worse performance in the Montreal Cognitive Assessment Test (p = 0.00), Verbal Fluency (p = 0.00), Stroop (p = 0.00), Clock Drawing Test (p = 0.00), Digit Span (p = 0.00) and Matrix Reasoning (p = 0.01). After statistical adjustment by linear regression, migraine continued to be the only relevant factor in the poorer performance in the Montreal Cognitive Assessment, Verbal Fluency, Clock Drawing and Stroop tests.

A study conducted by Sreedhar et al., 2018 [82] to see the effect of migraine on various cognitive functions where patients were selected on the basis of clinical examination and screening by using MSS (Migraine severity scale), Headache impact test, hospital anxiety and depression scale (HADS), Wisconsin Card Sorting Test, Trail Making Test, and Control grouped Oral word Association Test found that migraine group to have deficits in some aspects of problem-solving and concept formation competencies in comparison with healthy individuals and also found strong and weak correlation with various clinical variables such as its severity, duration, and headache impact indicating the role of migraine on cognitive functioning.

A study by Raquel et al[83], 2019 to find the different types of cognitive dysfunctions associated with migraine and the mechanisms that are potentially causing them. The findings revealed that reversible attack-related cognitive dysfunction seems extremely consistent and likely related to functional cortical and subcortical brain changes occurring during attacks, interictal cognitive dysfunction is less consistent and

might become more relevant as attack frequency and disease complexity increase.

A cohort study by Sajobi et al., 2019[84] investigated how migraine patients rate the severity of their disease and how these ratings correlate with their socio-demographic, clinical, and psycho-social characteristics. They obtained a broad range of clinical and patient-reported measures (e.g., patients' ratings of migraine severity using the Global Assessment of Migraine Severity (GAMS), and migraine-related disability, as measured by the Migraine Disability Scale (MIDAS)). Depression was measured using the 9-item Patient Health Questionnaire (PHQ-9) and the 14-item Hospital Anxiety and Depression Scale (HADS). Median regression analysis was used to examine the predictors of patient ratings of migraine severity found the mean age for the patients was 42.5 years (SD = 13.2). While 209 (79.4%) patients were females, 177 (67.4%) participants reported "moderately severe" to "extremely severe" migraine on the GAMS, and 100 (31.6%) patients had chronic migraine. Patients' report of severity on the GAMS was strongly correlated with patients' ratings of MIDAS global severity question, overall MIDAS score, migraine type, PHQ-9 score, and frequency of migraine attacks. Mediation analyses revealed that MIDAS mediated the effect of depression on patient ratings of migraine severity, accounting for about 32% of the total effect of depression. Overall, migraine subtype, frequency of migraine, employment status, depression, and migraine-related disability were statistically significant predictors of patient-ratings of migraine severity.

A study conducted by Baschi et al., 2019[85] evaluated cognitive performance for visuospatial memory and learning between MwA and healthy control groups underwent visuospatial memory test (Corsi test) and verbal memory test (Buschke Selective Reminding Test) in supraspan modality, Trial Making Test A (TMTA) and B (TMTB) as test exploring attention, and TMTB-TMTA as test of executive functioning. Depression was assessed with the Beck Depression Inventory Short Form (BDI-SF). Migraine characteristics (i.e., disease duration and

frequency expressed as attacks per month) were collected and found subjects with MwoA showed better performance than HC in test exploring both short (p = 0.002) and long-term (p = 0.001) visuospatial memory. No significant difference between groups was found in verbal memory, attention, executive functioning, and depression (BDI-SF). No significant association emerged between cognitive performance and migraine characteristics.

A study done by Russo et al., 2019[86] examined a causal relationship between stress and migraine, coping strategies by assessing patients with migraine without aura (MwoA) and sixty-one healthy control groups (HCs) on three self-report questionnaires the Coping Orientation to Problems Experienced (COPE), the Coping Inventory for Stressful Situation (CISS), and the Proactive Coping Inventory (PCI). Moreover, the Perceived Stress Scale (PSS), a scale measuring self-perception of stress, global cognitive functioning, depressive symptoms, apathy, state, and trait anxiety, was also administered to all participants found no significant difference on the scales and subscales of PCI and CISS as well as in the PSS between MwoA patients and HCs. However, the two groups showed different scores in the subscale “turning to religion” of COPE (22 08 ± 5 19 in migraineurs vs. 24 70 ± 4 44 in HCs, p = 0 003).

A study held by Ricarte et al.,2020[87] compared Executive functions (EFs) , short term memory and coping. The study collected measures of depression, EFs, short-term memory, and coping. They found that young participants scored higher than older adults on EFs and short-term memory. Moreover, in young adults, there was a prevalence of avoidance coping strategies. Scores on depressive symptomatology were found to be related to avoidant coping strategies. Older adults with higher score on inhibition used less avoidant coping. Seemingly, that executive deficits might contribute to depression, as they affect processes for coping with stress. Thus, current finding may have implications for the role of EFs and coping in psychological well-being and successful adaptation of individuals to stressful situations.

Rourke et al., 2020 [88]examined executive function (EF), coping, and anxiety in a sample of 210 emerging adults to find out the relation between EF and coping as well as how coping may moderate the relation between EF and anxiety found that EF impairment is related to greater disengagement and emotion-focused coping. Furthermore, both EF dysfunction and disengagement coping strategies were associated with increased anxiety. Emotion-focused coping and disengagement coping moderated the relation between EF impairment and anxiety.

MATERIALS AND METHODS

RESEARCH DESIGN

The hospital based, cross-sectional study design was conducted in DMC&H, Ludhiana. In which the investigator measured the outcome and the exposures in the study participants at the same time.

SOURCE OF DATA

Study was conducted on patients with migraine presenting to Neurology OPD, DMC&H, Ludhiana.

METHOD OF COLLECTION OF DATA

SAMPLE COLLECTION- The study included 50 patients with Migrainein age group 20-40 years from the department of Neurology in DMC& Hospital, Ludhiana and 50 control group from those residing in Ludhiana with matched age group.

INCLUSION CRITERIA:

1. Patients diagnosed with migraine with aura, without aura according to the International Classification of Headache Disorders. The current version, the ICHD-3 Beta.
2. Age group between 20-40 years.
3. Subjects with a formal education of at least 12+ years

EXCLUSION CRITERIA:

1. Patient with any neurosensory deficits, communication problems, developmental disabilities such as Intellectual disability.
2. Behavioral disorders such as addiction to drugs and alcohol

INCLUSION CRITERIA (Control group)

1. Individuals not diagnosed with Migraine
2. Age group between 20-40 years
3. Subjects with a formal education of at least 12+ years
4. Subjects with no history of diagnosed psychiatric illness.

EXCLUSION CRITERIA (Control group)

1. Individuals with any other chronic illness
2. Subjects with no history of diagnosed psychiatric illness.

METHODOLOGY

The study was conducted on 50 patients with Migraine and 50 without Migraine (control group). Informed consent was taken from the patients. Socio-demographic Proforma was filled containing the basic information about the patient. Both the groups were evaluated on the Executive Functioning test by using Digit span test, Stroop color-word test, Trail-making test A & B and Clock Drawing Test. For evaluation of coping strategies, Brief-Cope questionnaire was administered. Hospital anxiety and depression scale (HAD-S) was administered to determine the levels of anxiety and depression that a person is experiencing.

TOOLS:

1. Socio-Demographic Proforma
2. Executive Functioning Test
3. Brief Cope Inventory
4. Hospital Anxiety and Depression Scale

1. SOCIO-DEMOGRAPHIC PROFORMA:

It included the name of the patient, age, gender, MRD number, occupation, education, income, marital status, duration of illness, frequency of attack, contact number and scores of all the test.

2. EXECUTIVE FUNCTIONING TEST:

A detailed evaluation for executive functions using neuropsychological tests:

Trail Making Test (TMT):

The Trail Making Test is a neuropsychological test of visual attention and task switching. It can provide information about visual search speed, scanning, speed of processing, mental flexibility, as well as executive functioning. It was originally part of the Army Individual Test Battery (Armitage, 1946).

Consist of 25 circles distributed over a sheet of paper. In Part A, the circles are numbered 1 – 25, and the patient should draw lines to connect the numbers in ascending order. In Part B, the circles include both numbers (1 – 13) and letters (A – L); as in Part A, the patient draws lines to connect the circles in an ascending pattern, but with the

added ask of alternating between the numbers and letters (i.e., 1-A-2-B-3-C, etc.). The patient should be instructed to connect the circles as quickly as possible, without lifting the pen or pencil from the paper. Time the patient as he or she connects the "trail." If the patient makes an error, point it out immediately and allow the patient to correct it. Errors affect the patient's score only in that the correction of errors is included in the completion time for the task.

In head injured patients following intervals of between 24-36 hours, correlations for Trails A was .83 and for Trails B was .90. Practice effects have been found to significant only for Trails B[89]

Stroop Color- Word Test- to assess the ability to inhibit cognitive interference that occurs when the processing of a specific stimulus feature impedes the simultaneous processing of second stimulus attribute. It contains one sheet of color task and color –word stimulus sheet. The subjects are required to read three different tables as fast as possible. Two of them represent the “congruous condition” in which participants are required to read names of color (henceforth referred to as color-words) printed in black ink (W) and name different color patches (C). Conversely, in the third table, named color-word (CW) condition, color-words are printed in an inconsistent color ink (for instance the word “red” is printed in green ink). Thus, in this incongruent condition, participants are required to name the color of the ink instead of reading the word. In other words, the participants are required to perform a less automated task (i.e., naming ink color) while inhibiting the interference arising from a more automated task (i.e., reading the word).

Golden (1979)[90] later reported that this task was able to assist in the localization of lesions and has been found to be useful in the identification of dyslexia. Perret (1974)[91] investigated the performance of patients classified as having frontal, temporal, and posterior brain damage on a color-word Stroop task.

In a study that modified the Stroop test methodology to assess color naming latencies for posttraumatic stress disorder (PTSD) words, test-retest reliability for a one week interval was r = .80 for the PTSD

interference indices (McNally et al., 1993)[92]. Franzen et al. (1987)[93] reported reliability coefficients for one and two week intervals. The reliability coefficients were .83 for the word score, .74 for the color score, and .67 for the color-word score

Clock Drawing Test: EF were evaluated using the Clock-Drawing Test (CDT). Each subject was given a pre-drawn circle and asked to insert numbers. Then, subjects were asked to place the clock hands to read '10 past 11'.

The method by Sunderland and colleagues[85] was adopted to score CDT performances. This is a 10-point scoring system: 1 denotes very poor and 10 the best performance. Five points are given for numbers placed in the correct position; the remaining points are given for accuracy of hands denoting the time 11:10. By convention, a score < 6 indicates relevant impairment.

It is used for screening for cognitive impairment as a measure of planning, spatial dysfunction and neglect. Scoring is descriptive by observation task. Main aspects to consider are

1. Correct spacing with even spaces between numbers
2. correct placement of all numbers and correct placement of hands (10 after 11) time: 11:10

The inter-rater reliability for Sunderland's method expressed ask was 0.58 (which is moderate), the Pearson correlation was 0.88 ($P < 0.000$—which is high (original article $0.86 < r < 0.97$). For Watson's method, the k was 0.3 (which is fair), while the Pearson correlation was 0.62 ($P < 0.000$)—which is still quite high (original article $0.90 < r < 0.93$).[95]

Digit Span Test DST (Forward and Backward) – PGI-Memory to assess working memory. Scoring: Total of Raw score converted into T.Q. It is used to assess attention-concentration and working memory.[96,97,98] It is quick, portable and easy to use, often forming an integral part of neuropsychological examinations and the mental state examination. The Digit span test comprises both digit forward and digit backward conditions. The test involves reading out a series of strings

of digits to the participants who are required to repeat them in the same or reverse order of presentation. Performance on the Digit span test requires auditory attention as well as short-term verbal memory. The test-retest reliability results revealed that the range of Pearson's correlation coefficients was 0.43~0.77. However, test-retest reliabilities increased up to 0.86 when a composite measure was used with a combination of at least two different tasks. Concurrent validity results suggested that the pointing version of the digit span measures shared only 25~40% of the total variance with the standardized measure of the digit span-recall. As short-term memory measures, digit and word forward pointing span measures were highly correlated (r=0.79).[99]

3. BRIEF COPE: The Brief COPE is an abbreviated version of the COPE Inventory given by Carver in 1997. The instrument efficiently measures 14 coping mechanisms with 28 items (two items for each coping process).

Scoring-Responses are scored on a 4-point scale that indicates how much the respondent has used the coping strategy depicted by the item:-

1-I haven't been doing this at all.

2-I've been doing this a little bit.

3-I've been doing this a medium amount.

4-I've been doing this a lot.

The COPE assesses some strategies that, in past research on coping, have been found to be adaptive (active coping, use of emotional support, use of instrumental support, positive reframing, planning, humor, acceptance, and religion), and some strategies that have been found to be maladaptive (self-distraction, denial, substance use, behavioral disengagement, venting, and self-blame).Brief COPE was developed on the basis of item reduction procedures, it probably shares in the validity previously established for the longer measure. Cronbach's alphas for the Brief COPE sub-scales range from 0.50 to 0.90.

4. Hospital Anxiety and Depression Scale (**HADS**) was originally developed by Zigmond and Snaith (1983)[100] and is commonly used by

doctors to determine the levels of anxiety and depression that a person is experiencing. The HADS is a fourteen item scale that generates: 7 of the items relate to anxiety and 7 relate to depression, HADS used in assessing severity and caseness of anxiety disorders and depression in both somatic, and psychiatric cases and in primary care patients and the general population"

The internal consistency reliability, assessed with ordinal alpha, was 0.92 for HADS Anxiety and 0.88 for HADS Depression. The corresponding internal consistency measured with traditional Cronbach's alpha was 0.87 and 0.81 respectively.[101]

Scoring:

Total score: Depression (D) _____ Anxiety (A) _____

0-7 = Normal

8-10 = Borderline abnormal (borderline case)

11-21 = Abnormal (case)

STATISTICAL ANALYSIS

Statistical analysis of the results of study was described in terms of range, mean standard deviation, frequencies (number of cases) and relative frequencies (% age) as appropriate. Chi square test was performed for analyzing categorical data. Pearson's correlation was done for analyzing correlation between variables. A probability value (p value) less than 0.05 was considered statistically significant. All statistical calculations were done using SPSS version 21.0 statistical programme for Microsoft windows.

OBSERVATIONS AND RESULTS

Table 1, shows the distribution of different age group between cases (patients) and control group.

		Group				Total	Chi-square value	p-value
		Cases		Control group				
AGE	20-25	7	14%	10	20%	17	2.045	0.563
	26-30	9	18%	11	22%	20		
	31-35	12	24%	7	14%	19		
	36-40	22	44%	22	44%	44		

Figure 1, shows the distribution of different age group between cases (patients) and control group.

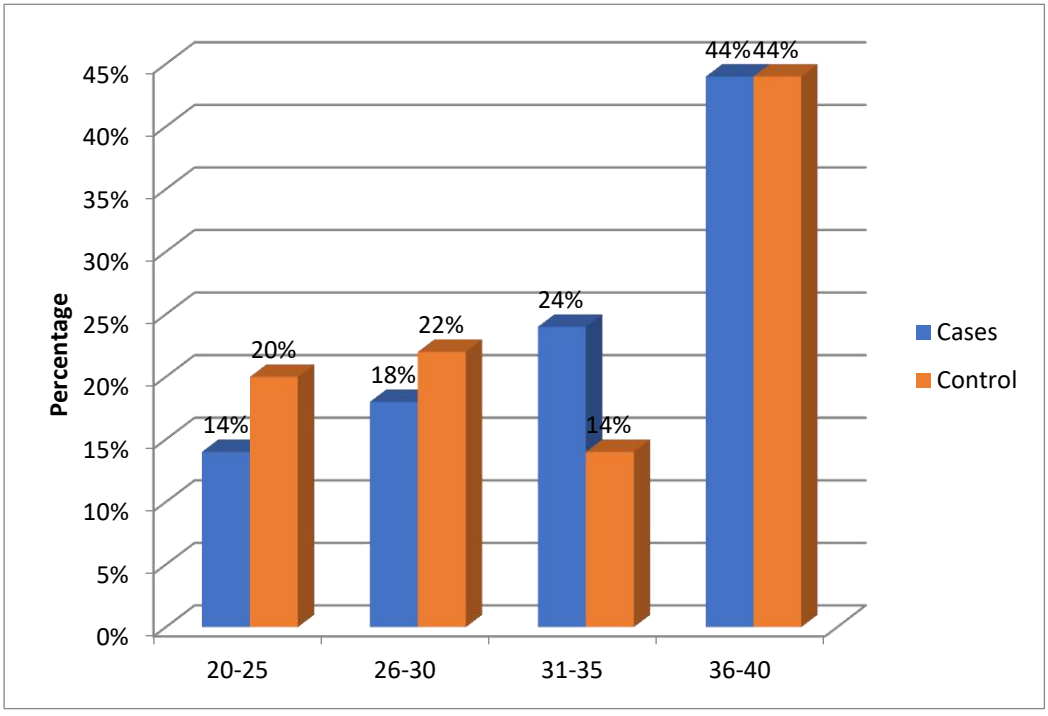


Table 2, shows the gender-wise distribution of the cases and control group.

		Group				Total	Chi-square value	p-value
		Cases	Cases	Control group	Control group			
SEX	F	42	84%	40	80%	82	0.271	0.603
	M	8	16%	10	20%	18		

Figure 2, shows the gender-wise distribution of the cases and control group.

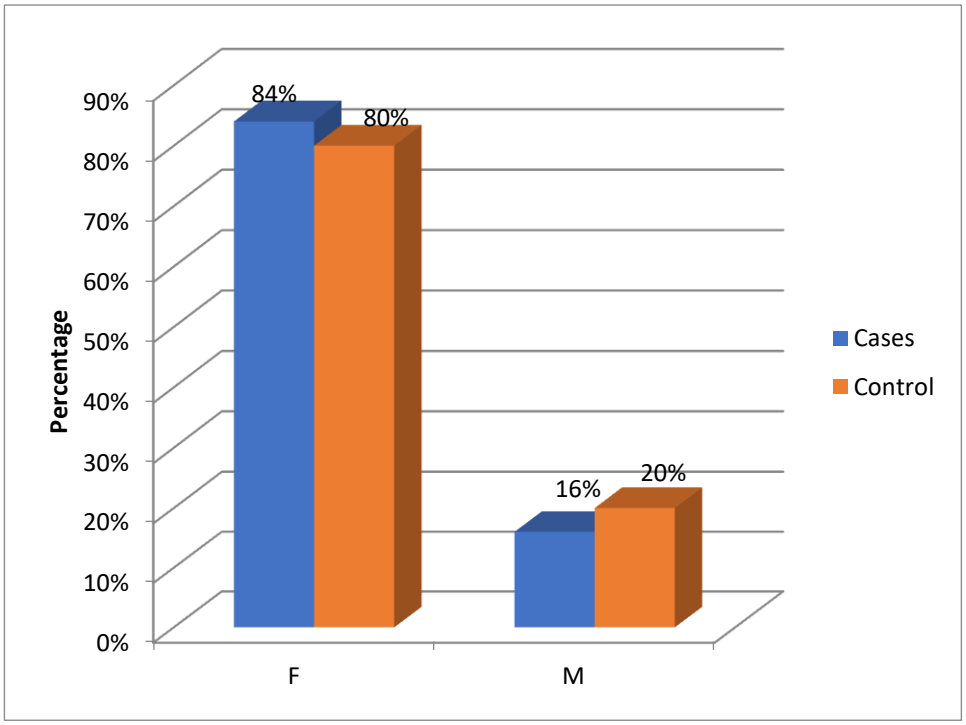


Table 3, shows the distribution of background between cases and control group.

		Group				Total	Chi-square value	p-value
		Cases	Cases	Control group	Control group			
RURAL/ URBAN	RURAL	14	28%	10	20%	24	0.877	0.349
	URBAN	36	72%	40	80%	76		

Figure 3, shows the distribution of background between cases and control group.

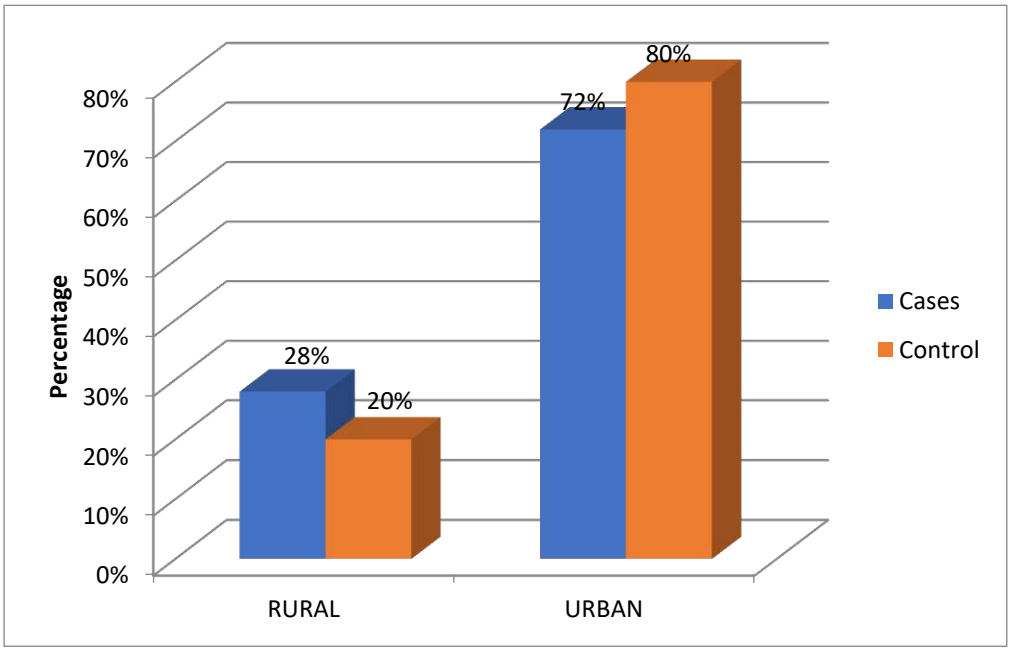


Table 4, shows the distribution of duration of Illness among patients.

DOI= LESS THAN 1 YEAR=1, 1-5 YEARS=2, 5-8 YEARS= 3, GREATER THAN 8=4		Cases	
	1	1	2%
	2	14	28%
	3	25	50%
	4	10	20%

Figure 4, shows the distribution of duration of Illness among patients.

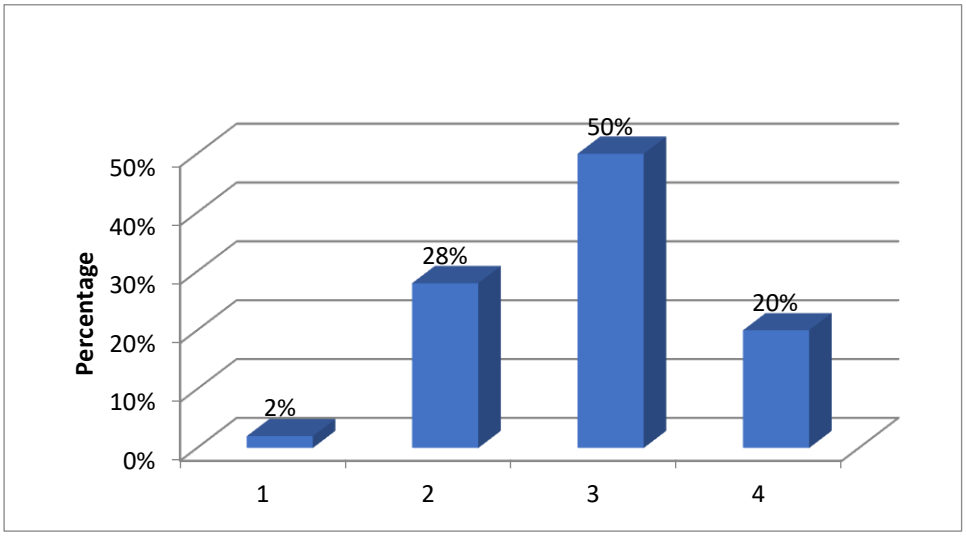


Table 5, shows the frequency of Migraine attack per week in patients.

		Cases	
Frequency	< 2	18	36%
	> 2	32	64%

Figure 5, shows the frequency of Migraine attack per week in patients.

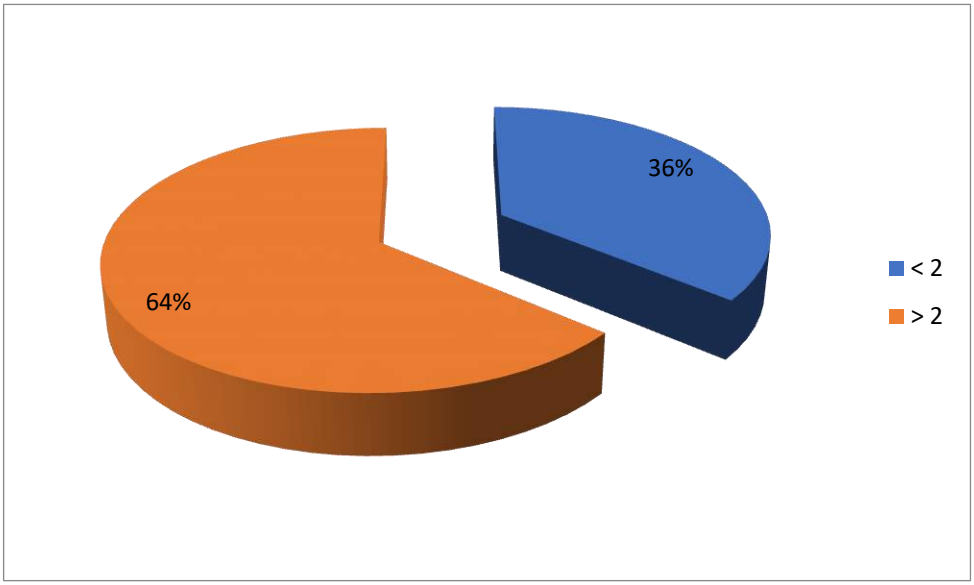
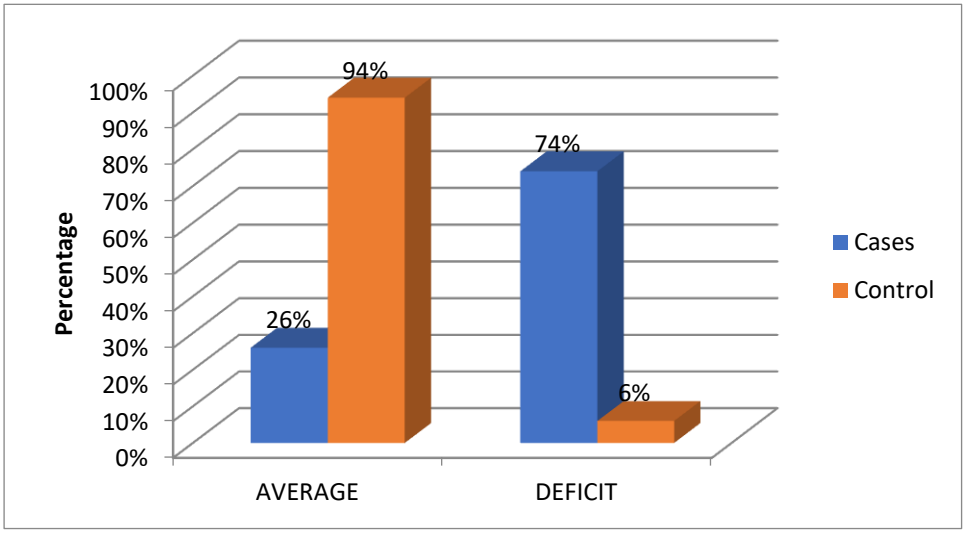


Table 6, shows the comparative distribution of TMT-A Performance in patients and control group.

		Group				Total	Chi-square value	p-value
		Cases	Cases	Control group	Control group			
DESCRIPTION TMT A	AVERAGE	13	26%	47	94%	60	48.711	0.0001
	DEFICIT	37	74%	3	6%	40		

Figure 6, shows the comparative distribution of TMT-A Performance in patients and control group.



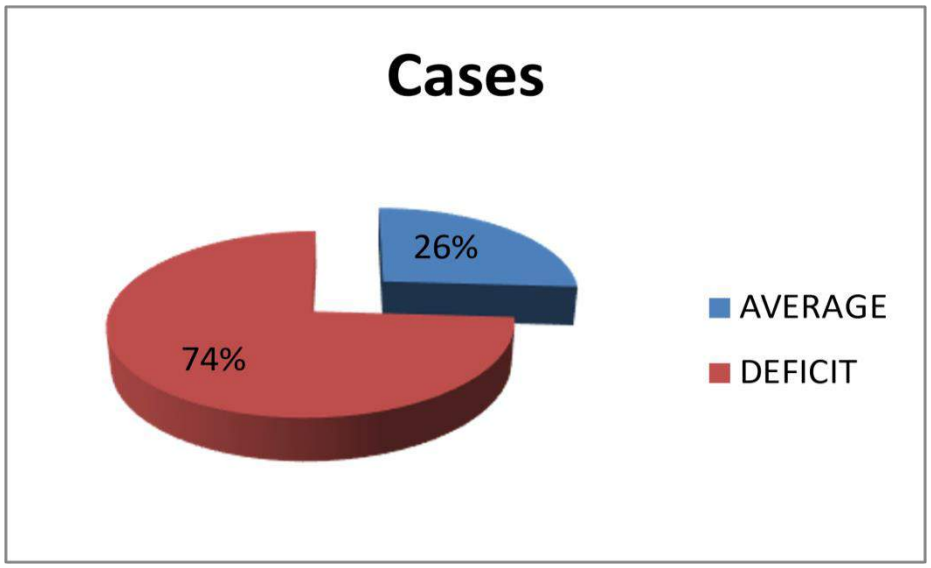
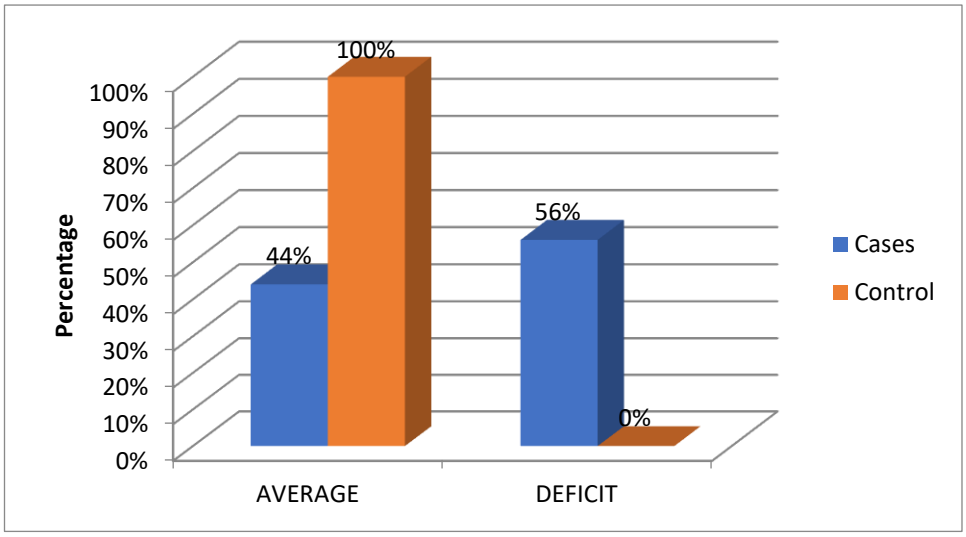


Table 7, shows the comparative distribution of TMT-B Performance in patients and control group.

		Group				Total	Chi-square value	p-value
		Cases	Cases	Control group	Control group			
DESCRIPTION TMT B	AVERAGE	22	44%	50	100%	72	38.889	0.001
	DEFICIT	28	56%	0	0%	28		

Figure 7, shows the comparative distribution of TMT-B Performance in patients and control group.



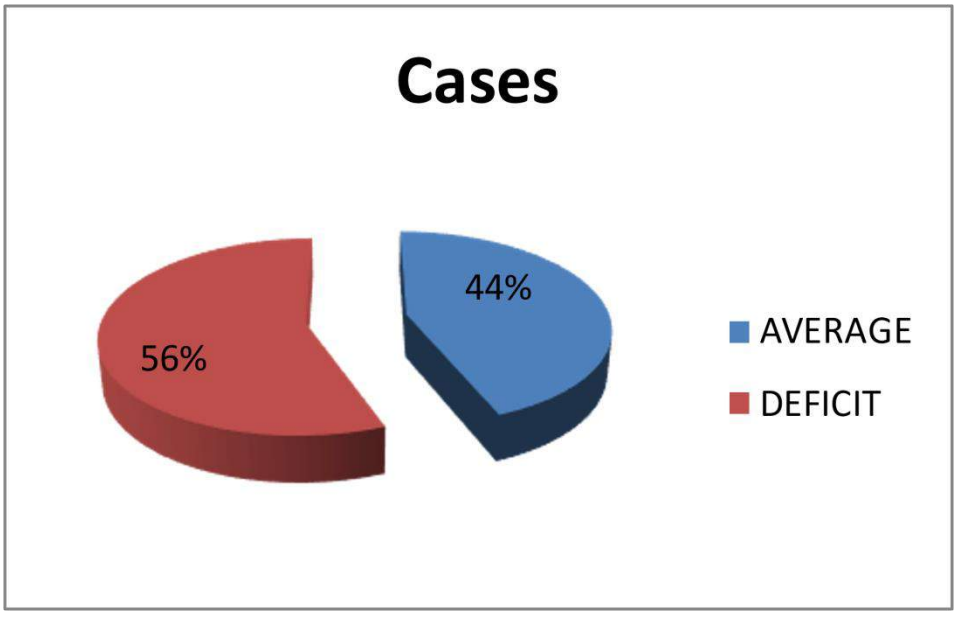


Table 8, shows the distribution of CDT performance on cases and control group.

		Group				Total	Chi-square value	p-value
		Cases	Cases	Control group	Control group			
CDT GROUP	1	13	26%	0	0%	13	38.394	0.001
	2	24	48%	7	14%	31		
	3	13	26%	43	86%	56		

Figure 8, shows the distribution of CDT performance on cases and control group.

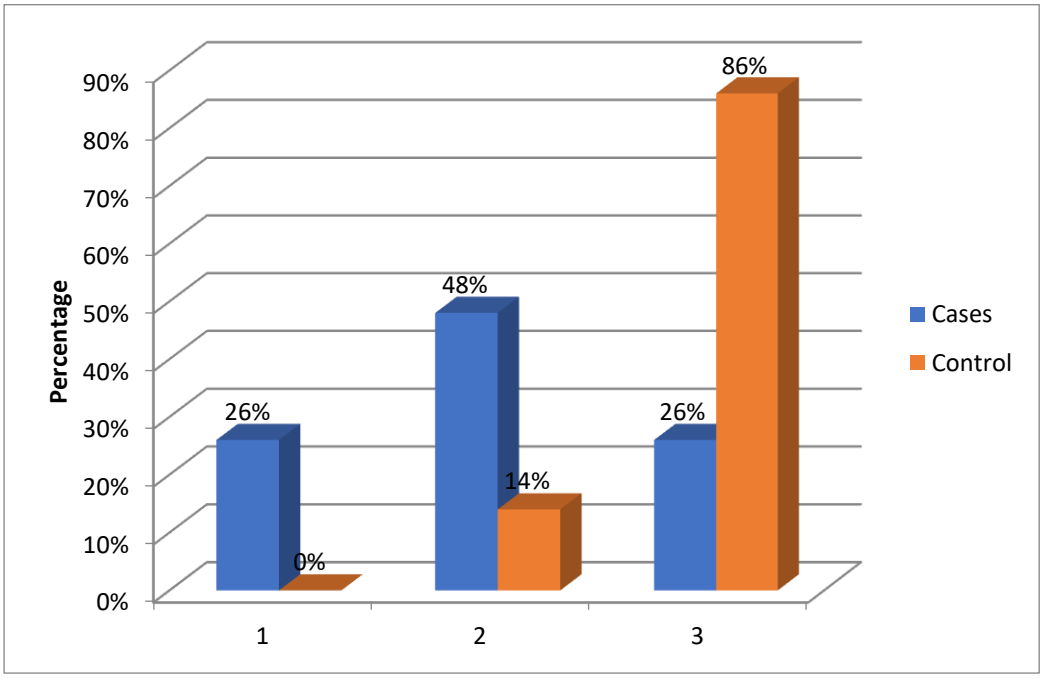


Table 9, shows the distribution of attention percentile in cases and control group.

		Group				Total	Chi-square value	p-value
	Percentile Rank	Cases	Cases	Control group	Control group			
ATTENTION	1	8	16%	2	4%	10	36.36	0.001
	2	32	64%	8	16%	40		
	3	6	12%	19	38%	25		
	4	3	6%	17	34%	20		
	5	1	2%	4	8%	5		
Total		50	100%	50	100%	100		

Figure 9, shows the distribution of attention percentile in cases and control group.

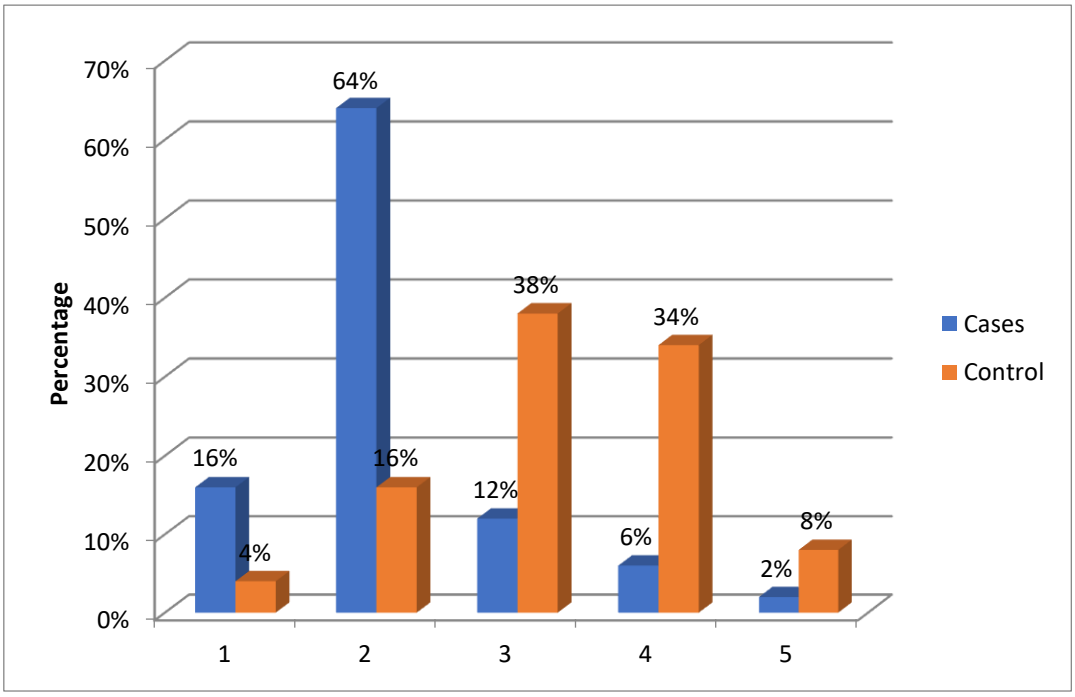


Table 10, we have tabulated the distribution difference of attention - forward in cases and control group.

		Group				Total	Chi-square value	p-value
		Cases		Control group				
FORWARD	3	1	2%	0	0%	1	26.849	0.001
	4	8	16%	4	8%	12		
	5	2	4%	0	0%	2		
	6	6	12%	4	8%	10		
	7	7	14%	2	4%	9		
	8	12	24%	7	14%	19		
	9	6	12%	3	6%	9		
	10	4	8%	14	28%	18		
	11	3	6%	2	4%	5		
	12	1	2%	14	28%	15		

Figure 10: we have tabulated the distribution difference of attention - forward in cases and control group.

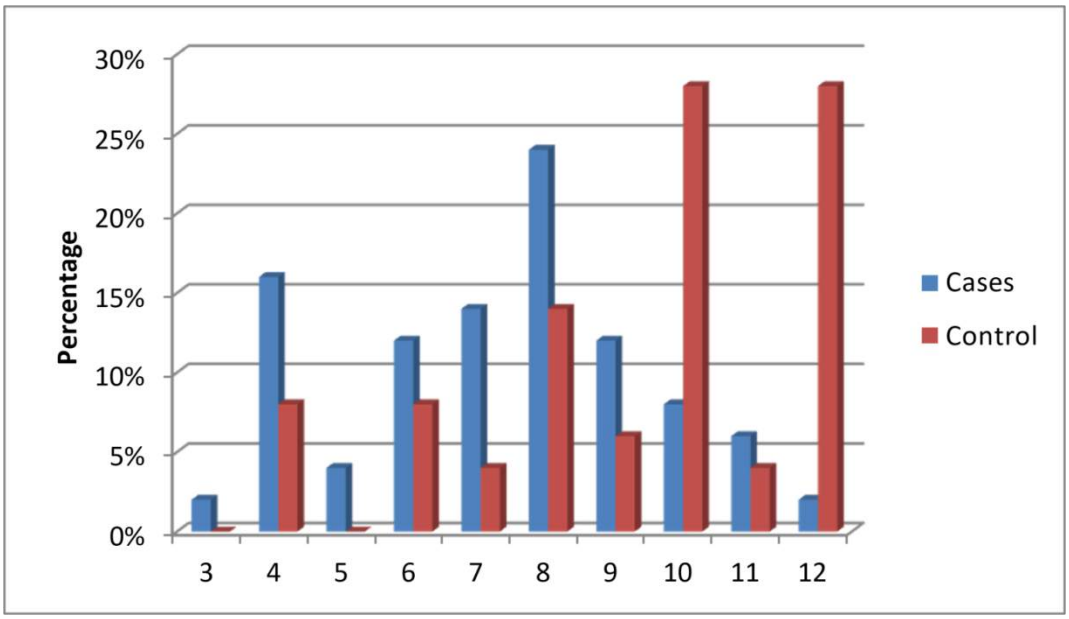


Table 11, we have tabulated the distribution difference of attention - Backward in cases and control group.

		Group				Total	Chi-square value	p-value
			Cases		Control group			
BACKWARD	2	5	10%	1	2%	6	55.122	0.0001
	3	0	0%	2	4%	2		
	4	16	32%	0	0%	16		
	5	8	16%	2	4%	10		
	6	13	26%	5	10%	18		
	7	2	4%	8	16%	10		
	8	2	4%	3	6%	5		
	9	0	0%	11	22%	11		
	10	3	6%	5	10%	8		
	11	0	0%	4	8%	4		
	12	0	0%	1	2%	1		
	13	0	0%	2	4%	2		
	14	0	0%	3	6%	3		
	15	0	0%	2	4%	2		
	16	1	2%	1	2%	2		
Total		50	100%	50	100%	100		

Figure 11, we have tabulated the distribution difference of attention - Backward in cases and control groups.

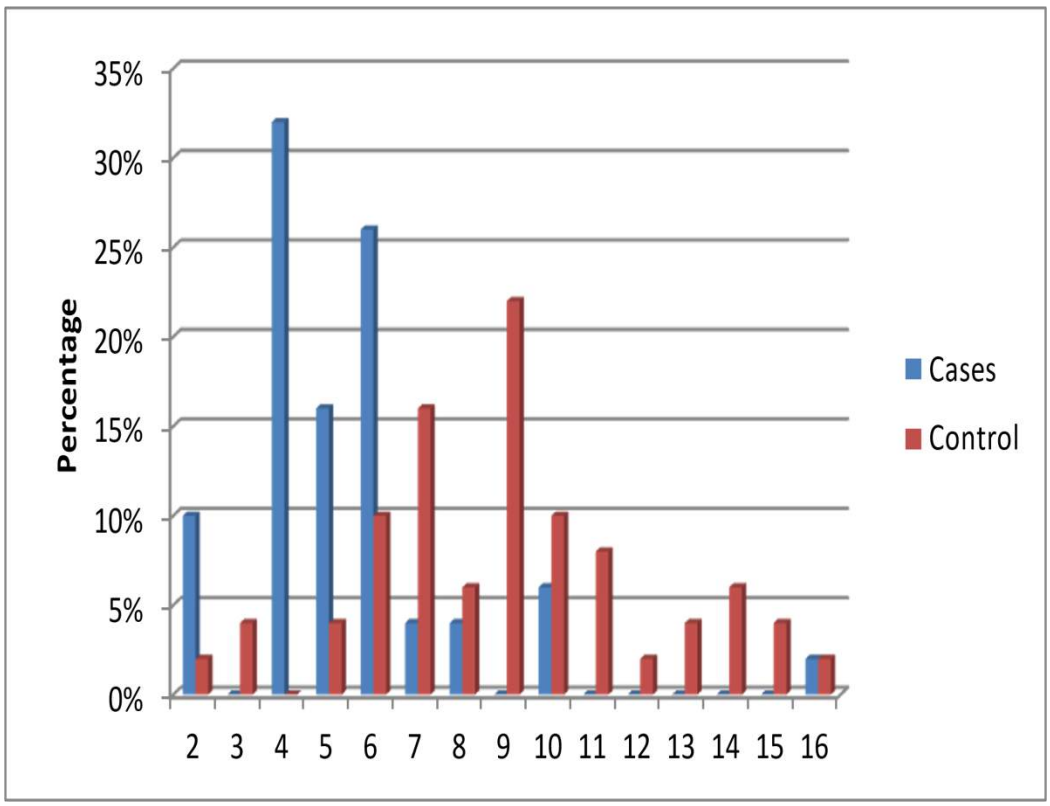


Table 12, shows the mean age of the patients.

	Cases		Control group		t	p-value
	Mean	SD	Mean	SD		
AGE	32.96	6.29	31.94	5.78	0.845	0.400

Figure 12, shows the mean age of the patients.

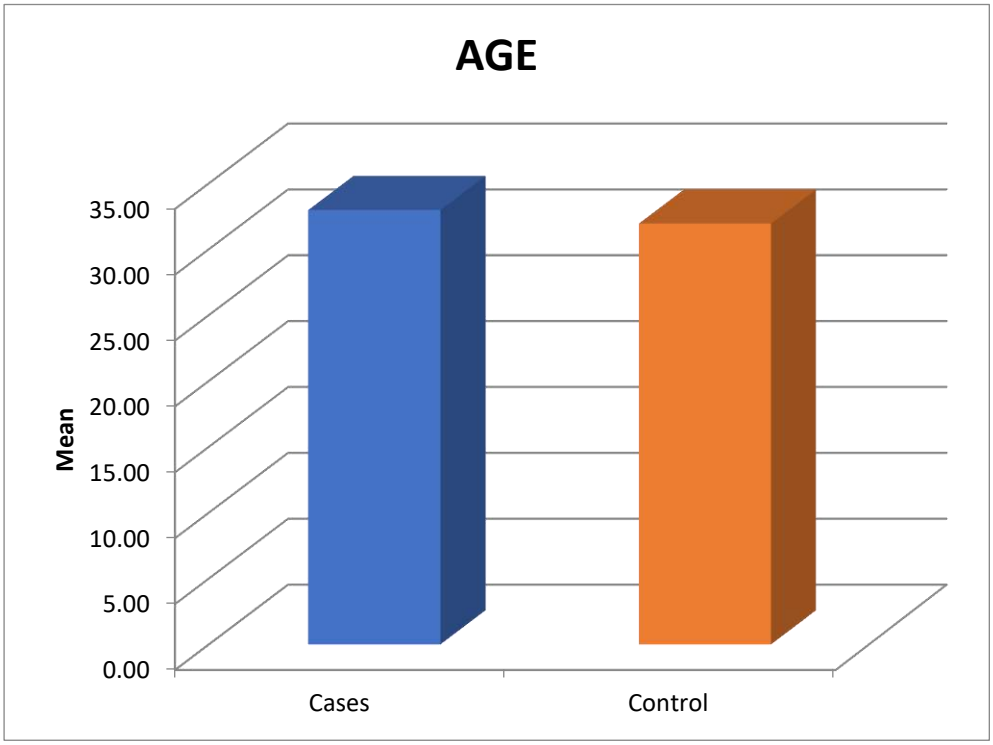


Table 13, shows the difference of mean value on TMT-A & TMT-B in both patients and control group.

	Cases		Control group		t	p-value
	Mean	SD	Mean	SD		
TMT-A	78.42	18.11	42.92	19.06	9.549	0.000
TMT-B	158.48	44.32	63.62	33.22	12.111	0.000

Figure 13, shows the difference of mean value on TMT-A & TMT-B in both patients and control group.

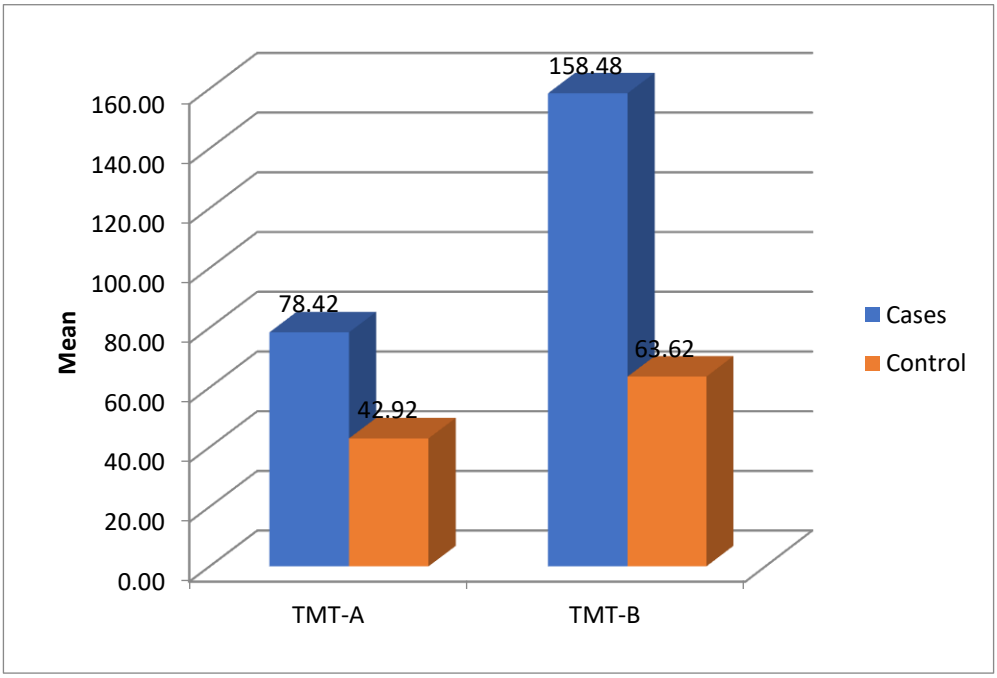


Table 14, shows the mean difference of stroop test on naming word, color and color-word of patients and control group.

	Cases		Control group		t	p-value
	Mean	SD	Mean	SD		
STROOP T	45.00	.000[a]	45.00	.000[a]		
WORD	77.24	15.54	87.32	9.20	-3.948	0.000
COLOR	50.06	13.39	79.62	10.84	-12.135	0.000
CO-WO	18.44	7.31	70.18	13.71	-23.542	0.000

Figure 14, shows the mean difference of stroop test on naming word, color and color-word of patients and control group.

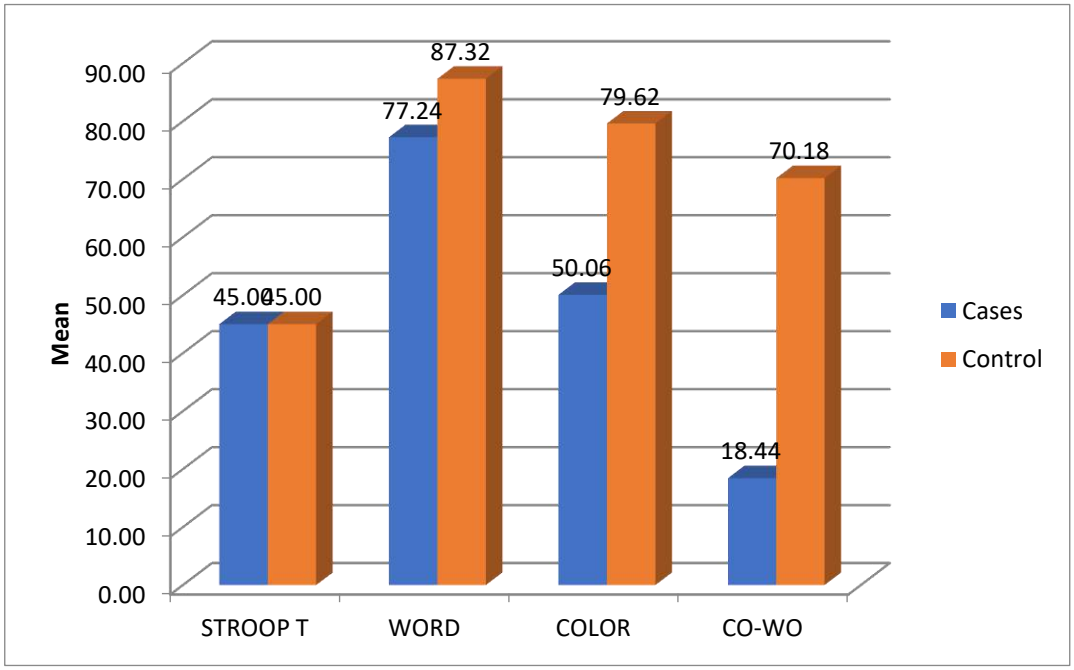


Table 15, shows the mean difference of interference score on stroop test.

	Cases		Control group		t	p-value
	Mean	SD	Mean	SD		
INTERFERENCE SCORE= Larger score poorer performance. (W-CW= INTERFERENCE SCORE)	31.62	11.21	9.44	5.61	12.506	0.000

Figure 15, shows the mean difference of interference score on stroop test.

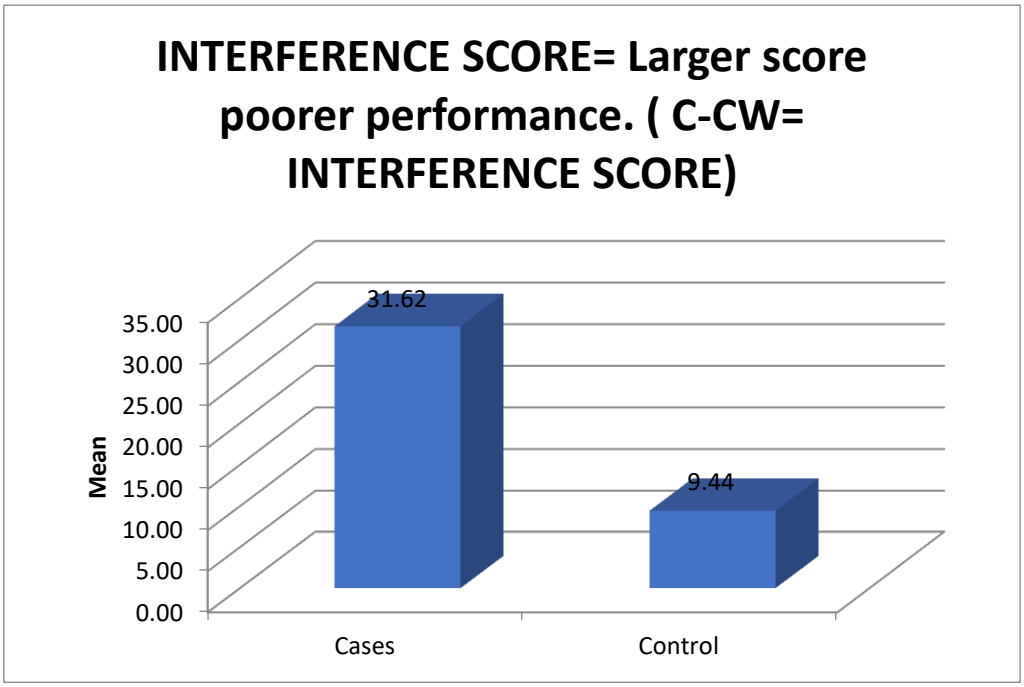


Table 16, shows the mean difference on CDT of patients and control group

	Cases		Control group		t	p-value
	Mean	SD	Mean	SD		
CDT	5.50	2.64	8.92	1.12	-8.441	0.000

Figure 16, shows the mean difference on CDT of patients and control group

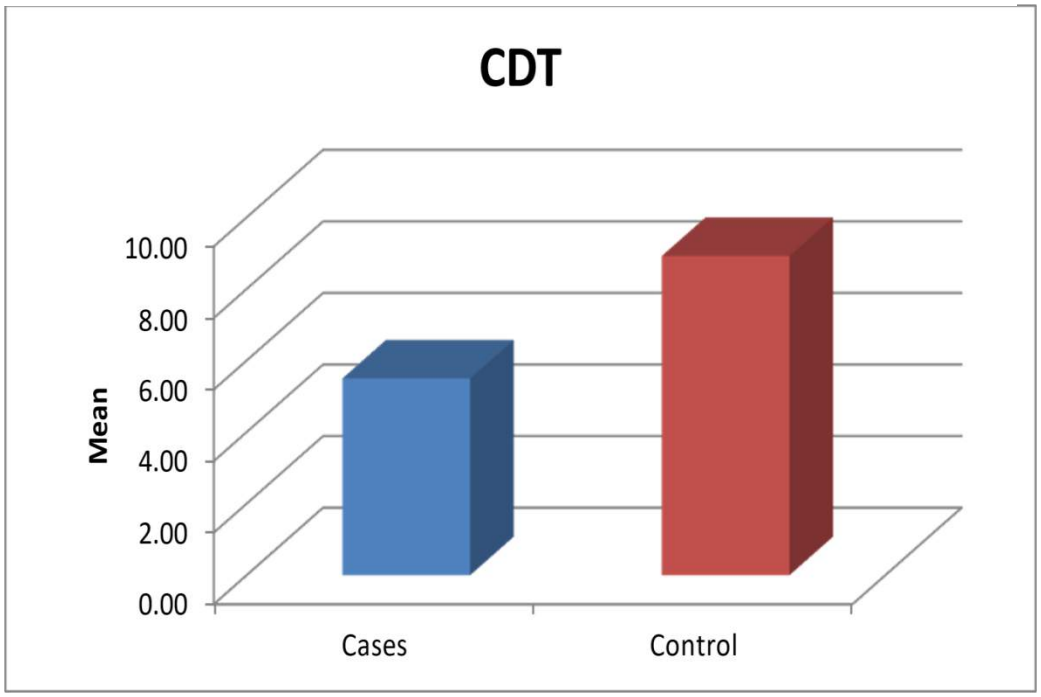


Table 17, shows the mean difference on attention (working memory) of patients and control group.

	Cases		Control group		t	p-value
	Mean	SD	Mean	SD		
ATTENTION	12.66	4.06	18.28	4.57	-6.504	0.000
FORWARD	7.30	2.22	9.34	2.45	-4.363	0.000
BACKWARD	5.36	2.43	8.94	3.16	-6.343	0.000

Figure 17, shows the mean difference on attention (working memory) of patients and control group.

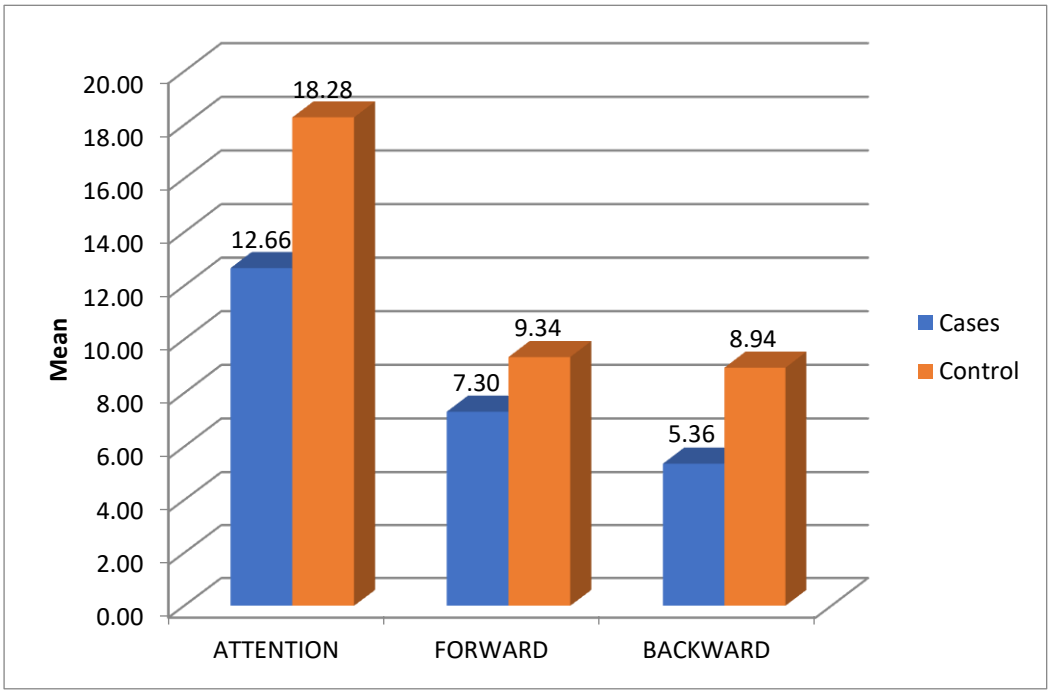


Table 18, shows the mean difference on Brief-Cope domains Avoidant and Adaptive of patients and control group.

	Cases		Control group		t	p-value
	Mean	SD	Mean	SD		
AVOIDANT	33.66	2.56	21.00	4.41	17.548	0.000
ADAPTIVE	21.64	3.28	38.10	4.23	-21.728	0.000

Figure 18, shows the mean difference on Brief-Cope domains Avoidant and Adaptive of patients and control group

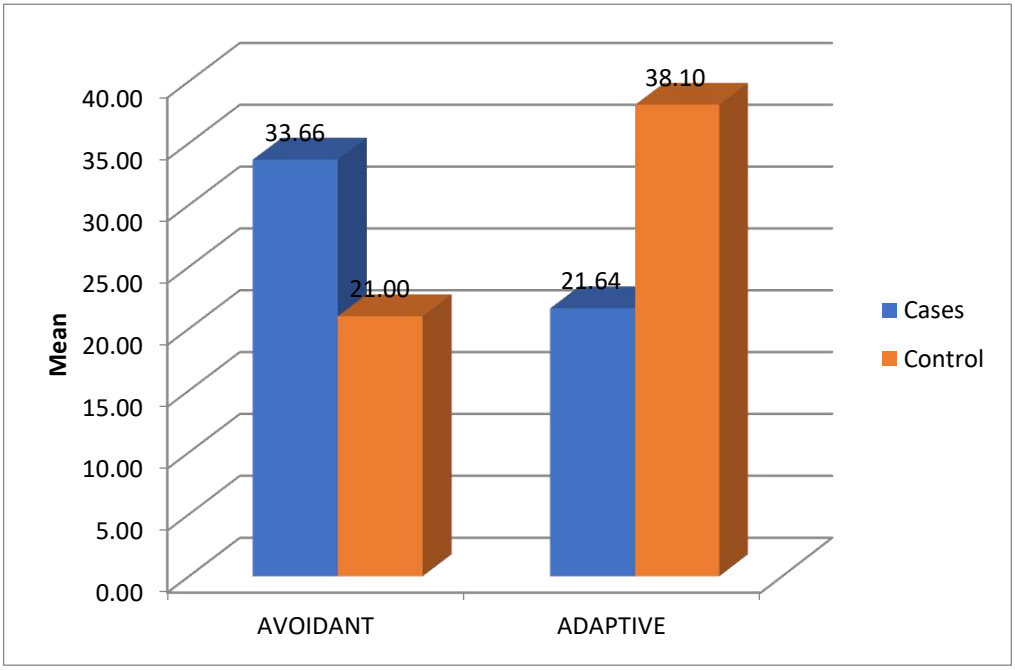


Table 19, shows mean difference of Adaptive Coping on Brief-Cope scale by patients and control group

	Cases		Control group		t	p-value
	Mean	SD	Mean	SD		
ACTIVE COPING	3.20	0.97	6.28	1.53	-12.049	0.000
EMOTIONAL SUPPORT	4.00	1.39	6.38	1.71	-7.640	0.000
INSTRUMENTAL SUPPORT	4.38	1.59	6.18	1.86	-5.204	0.000
POSITIVE REFRAME	3.30	1.37	6.52	1.49	-11.242	0.000
PLANNING	2.84	0.98	6.40	1.50	-14.076	0.000
ACCEPTANCE	3.92	1.35	6.34	1.67	-7.952	0.000
HUMOUR	4.36	1.40	5.08	2.03	-2.067	0.041
RELIGION	4.48	1.69	3.78	1.64	2.097	0.039

Figure 19, shows mean difference of Adaptive Coping on Brief-Cope scale by patients and control group.

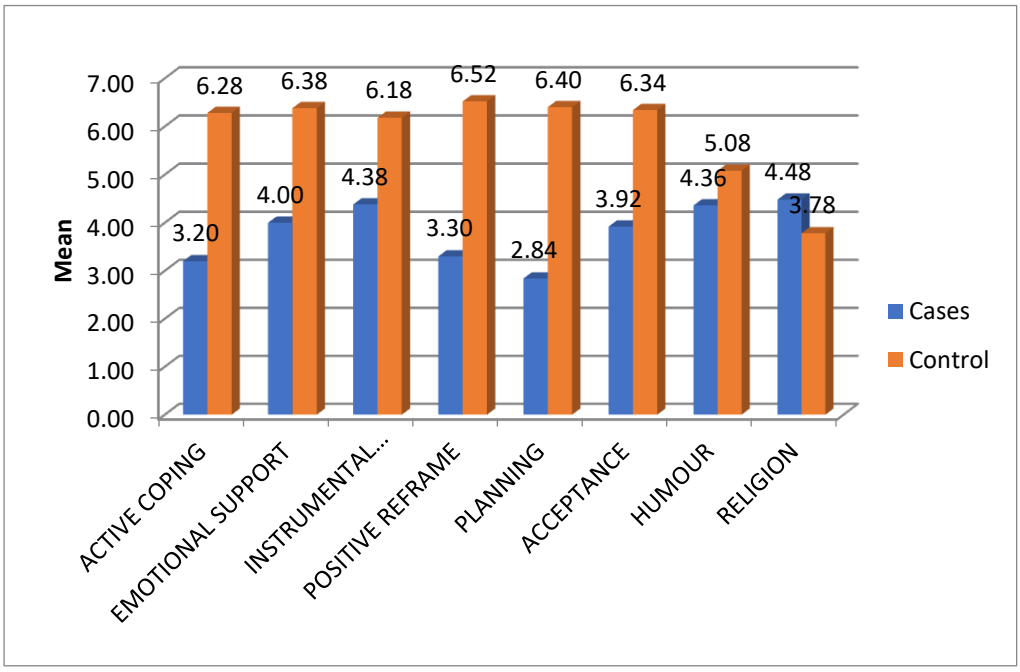


Table 20, shows mean difference of Avoidant Coping on Brief-Coping scale by patients and control group.

	Cases		Control group		t	p-value
	Mean	SD	Mean	SD		
SELF DISTRACTION	6.82	0.83	3.70	1.57	12.449	0.000
DENIAL	6.38	1.03	3.16	1.36	13.352	0.000
SUBSTANCE USE	2.48	1.16	2.58	1.01	-0.458	0.648
BEH. DISEN.	6.60	0.88	4.56	1.54	8.128	0.000
VENTING	4.86	1.71	3.92	2.01	2.517	0.013
SELF BLAME	6.52	0.93	3.08	1.16	16.372	0.000

Figure 20, shows mean difference of Avoidant Coping on Brief-Coping scale by patients and control group.

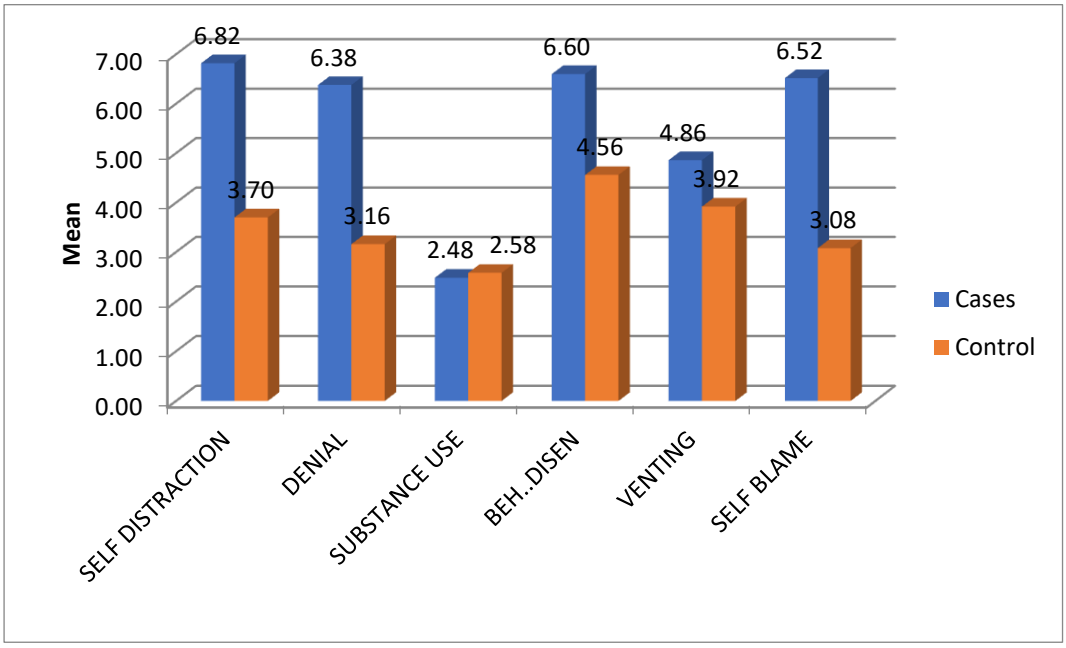


Table 21, shows intergroup observation of HAD Scale between patients and control group.

	Cases		Control group		t	p-value
	Mean	SD	Mean	SD		
HADS-D	9.20	2.42	5.92	2.16	7.149	0.000
HADS-A	10.96	2.70	7.96	3.60	4.720	0.000

In Figure 21, shows intergroup observation of HAD Scale between patients and control group

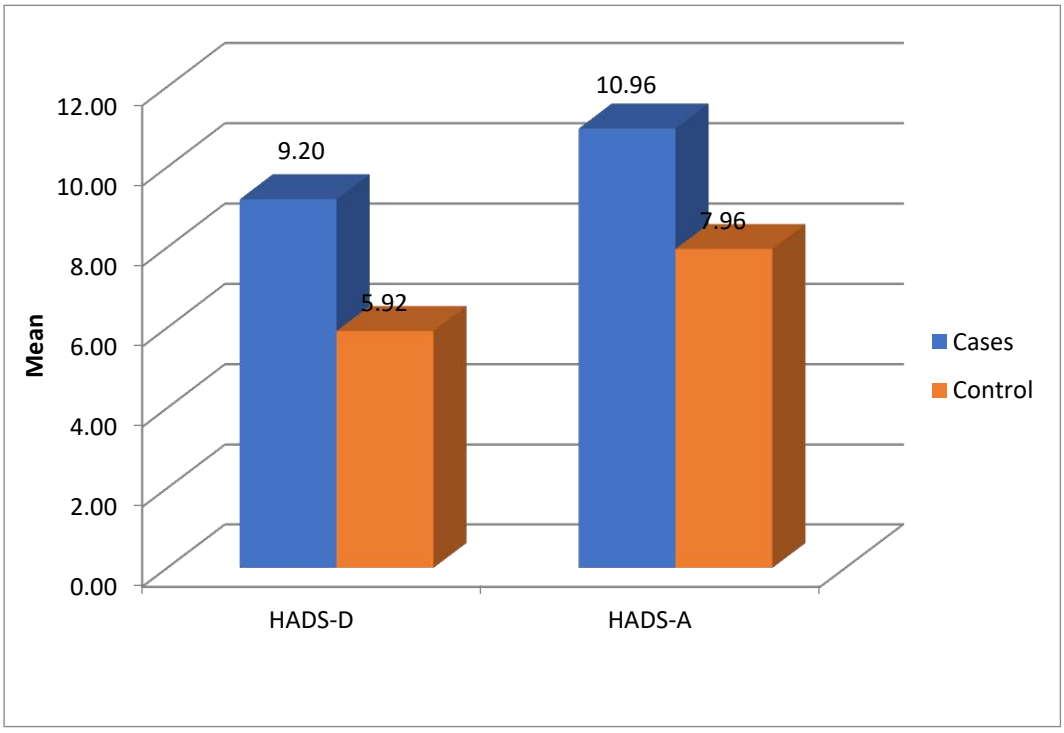
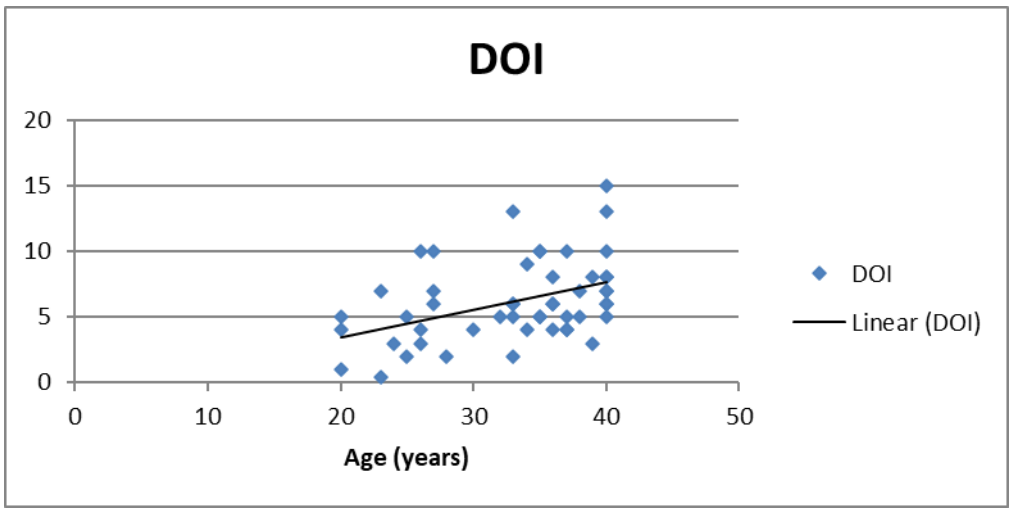


Table 22, shows the correlation between Age and DOI, FoA

		AGE	DOI	FREQUENCY/WEEK
AGE	Pearson Correlation	1.000	.418**	-.289*
	p-value		0.003	0.042
	N	50	50	50

Figure 22, shows the correlation between Age and DOI, FoA



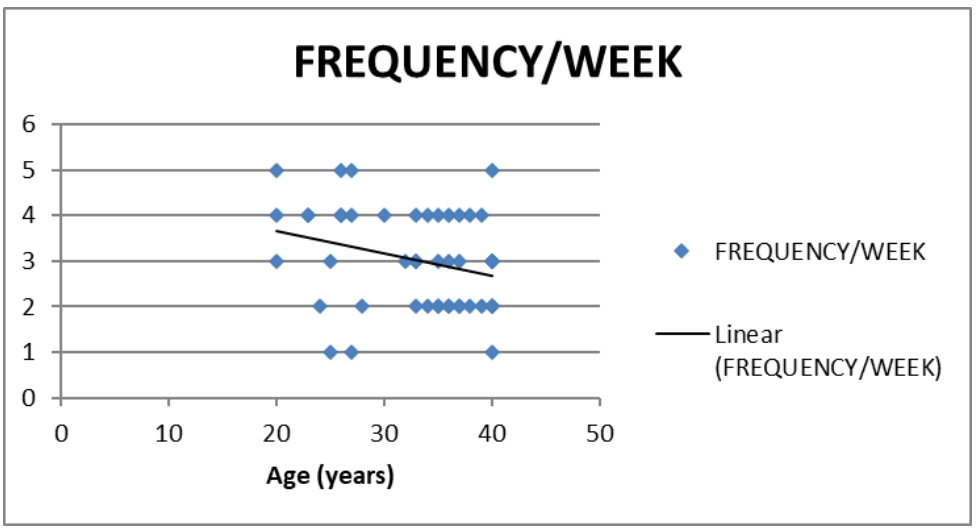


Table 23, shows the correlation between Age & Domain of executive functioning-CDT.

CDT		
AGE	Pearson Correlation	-.282*
	p-value	0.047
	N	50

Figure 23, shows the correlation between Age & Domain of executive functioning-CDT.

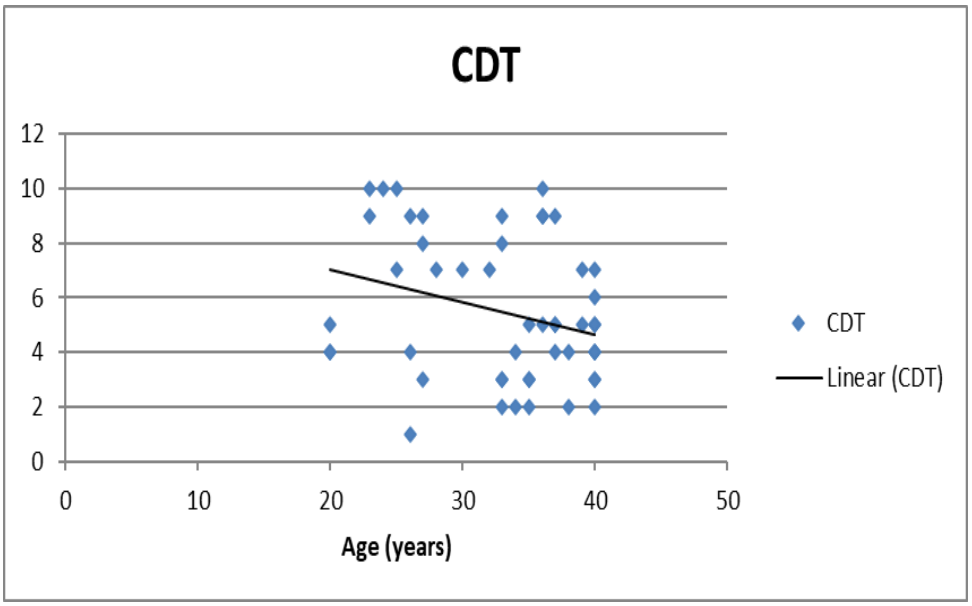
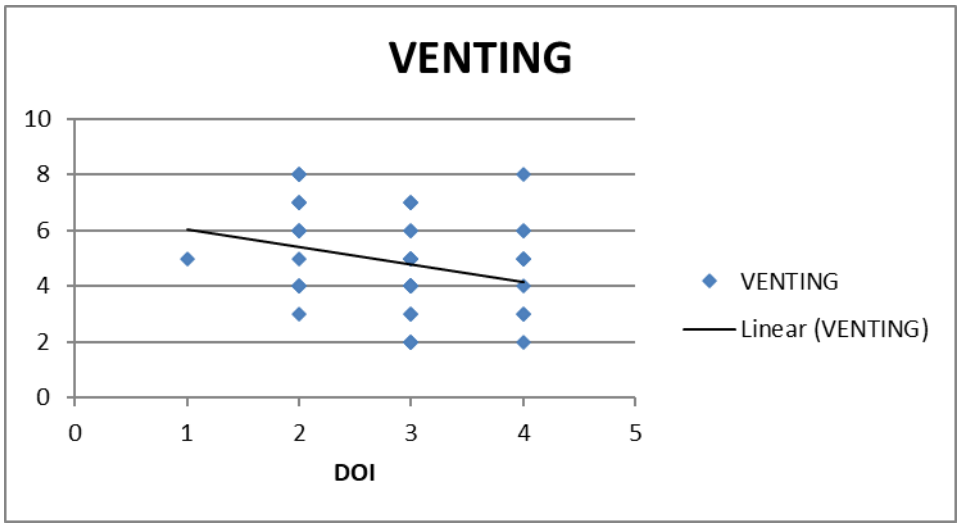


Table 24, shows the correlation between DOI and domains of coping strategies- Venting & acceptance.

		Venting	Accept
DOI	Pearson Correlation	-.287*	-.354*
	p-value	0.043	0.012
	N	50	50

Figure 24, shows the correlation between DOI and domains of coping strategies- Venting & acceptance.



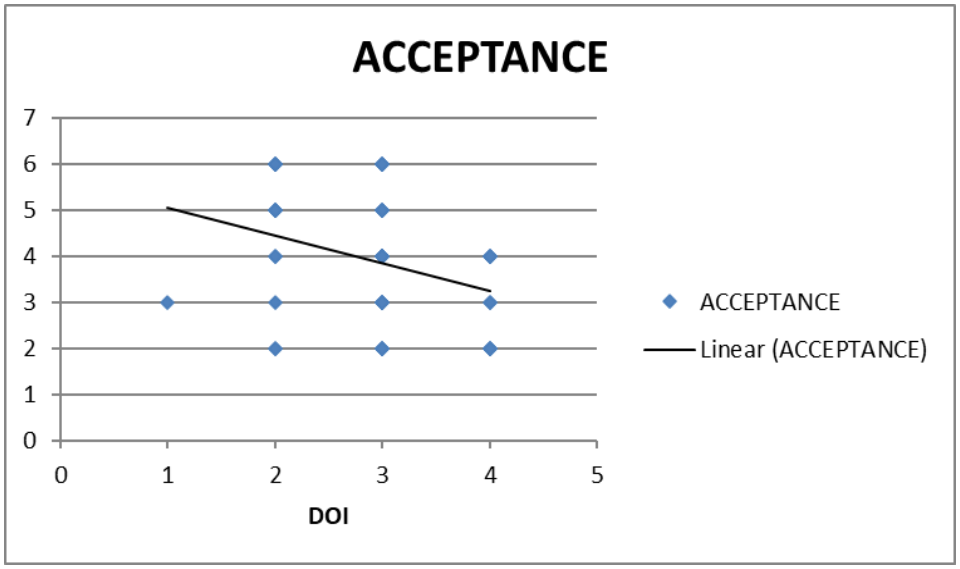


Table 25, we observed the correlation between DOI and clinical correlate- Anxiety.

HADS-A		
DOI	Pearson Correlation	.393**
	p-value	0.005
	N	50

Figure 25, we observed the correlation between DOI and clinical correlate- Anxiety.

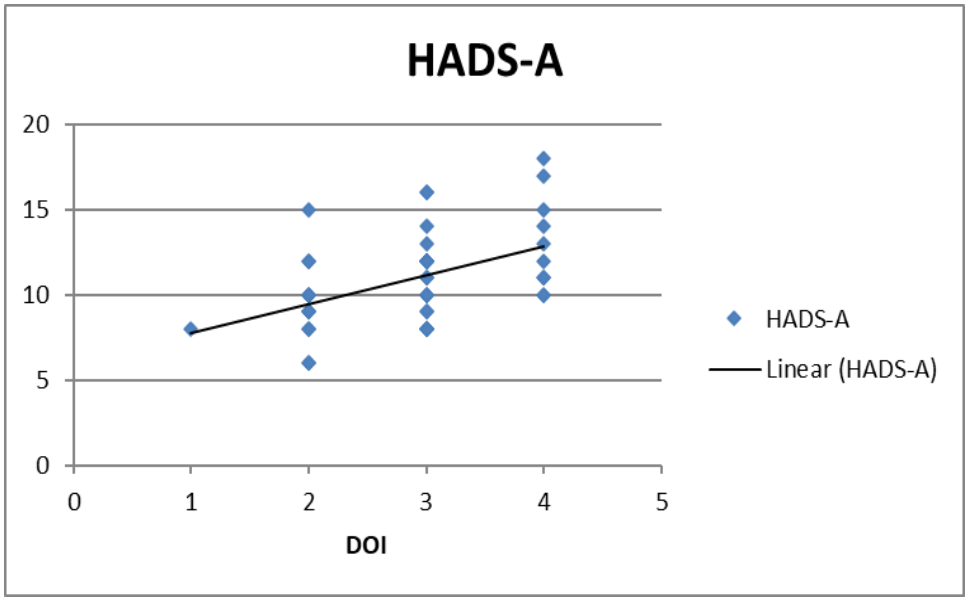


Table 26, shows correlation between TMT-A and domain of coping-self blame.

SELF BLAME		
TMT-A	Pearson Correlation	-.281*
	p-value	0.048
	N	50

Figure 26, shows correlation between TMT-A and domain of coping-self blame

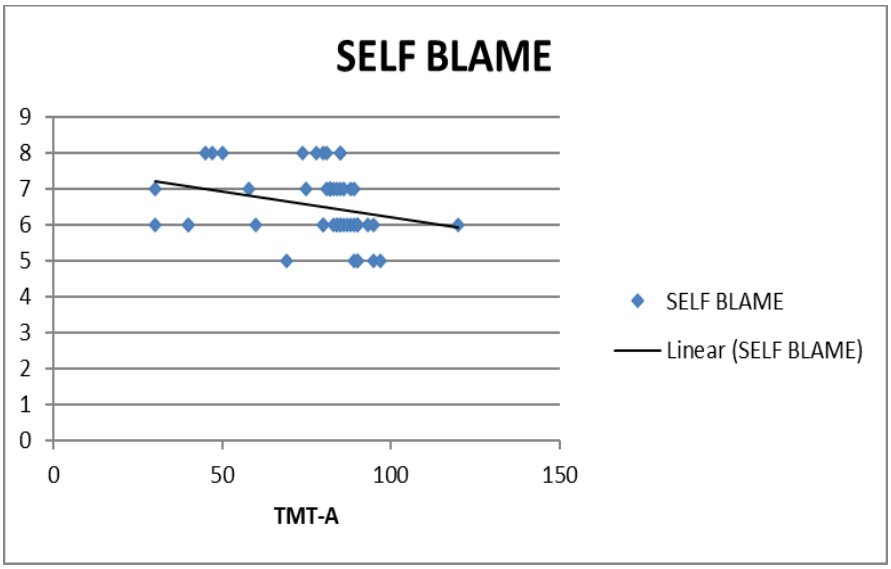


Table 27, shows correlation between TMT-A and clinical correlates – Depression.

HADS-DEPRESSION		
TMT-A	Pearson Correlation	-.281*
	p-value	0.048
	N	50

Figure 27, shows correlation between TMT-A and clinical correlates – Depression.

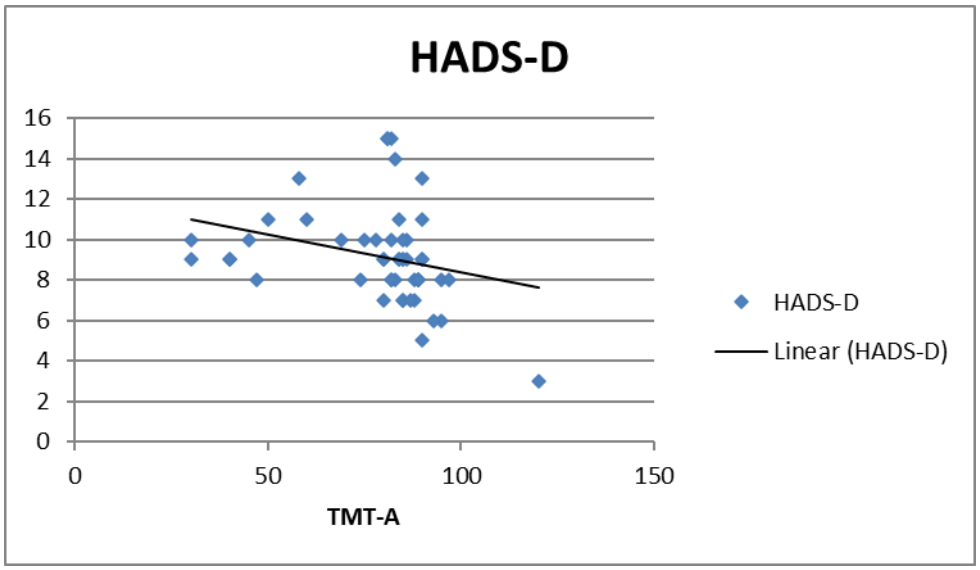


Table 28, we have shown the correlation between TMT-B and domain of coping- substance use

SUBSTANCE USE		
TMT-B	Pearson Correlation	-.343*
	p-value	0.015
	N	50

Figure 28, we have shown the correlation between TMT-B and domain of coping- substance use

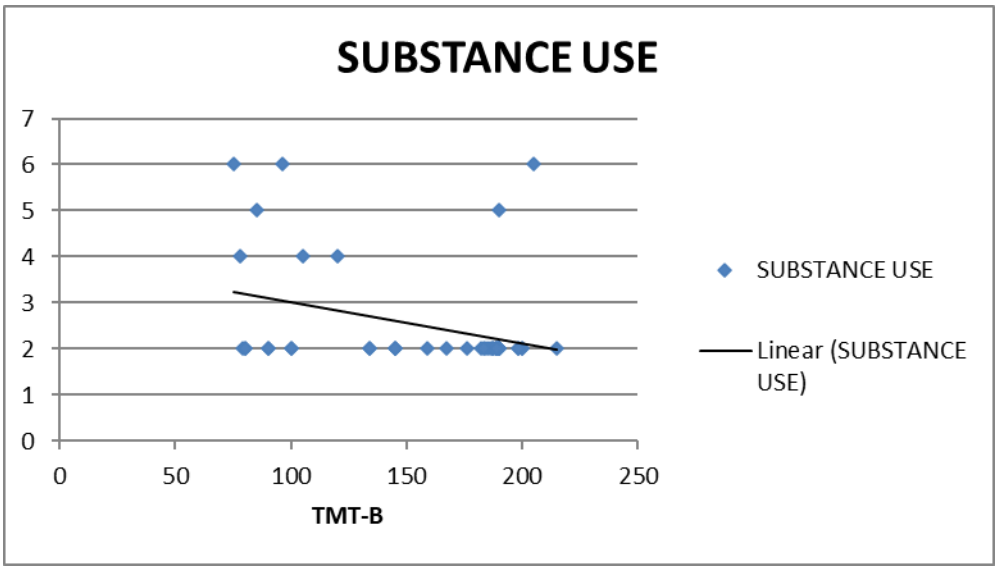


Table 29, shows correlation between TMT -B and depression.

DEPRESSION		
TMT-B	Pearson Correlation	-.361**
	p-value	0.010
	N	50

Figure 29, shows correlation between TMT -B and depression.

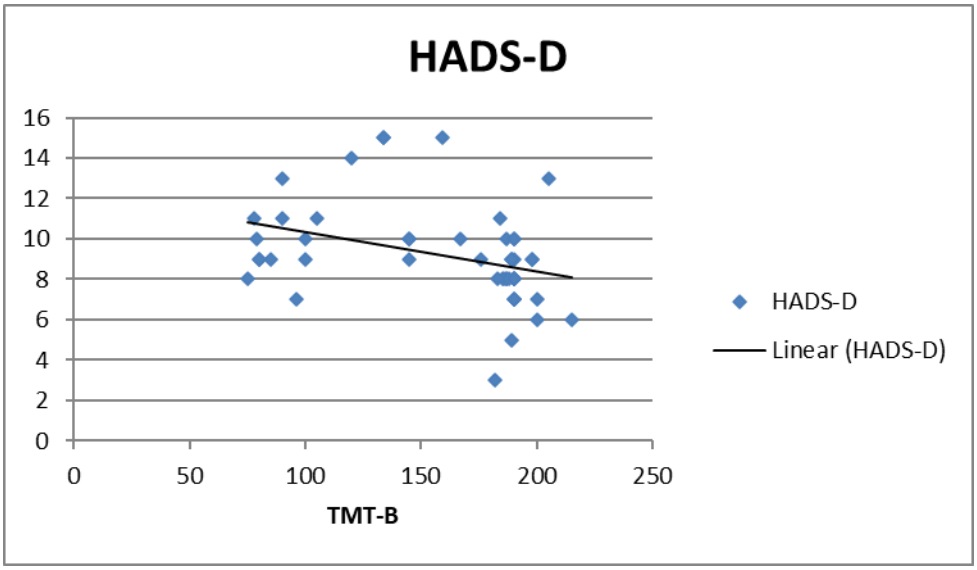


Table 30, shows correlation between Stroop interference and domains of coping- self blame and acceptance

		SELF BLAME	ACCEPTANCE
INTERFERENCE SCORE	Pearson Correlation	.279*	-.424**
	p-value	0.050	0.002
	N	50	50

Figure 30, shows correlation between Stroop interference and domains of coping- self blame and acceptance

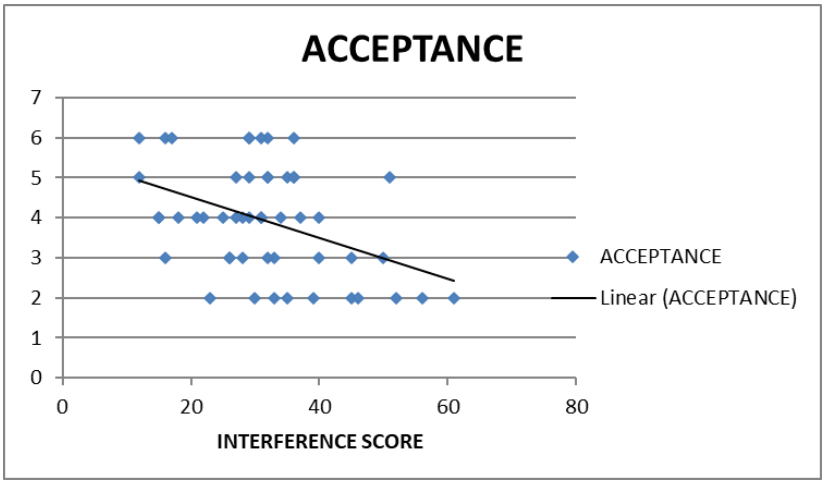


Table 31, correlates the relationship between Attention and domain of coping- venting

VENTING		
ATTENTION	Pearson Correlation	-.303*
	p-value	0.032
	N	50

Figure 31, correlates the relationship between Attention and domain of coping- venting

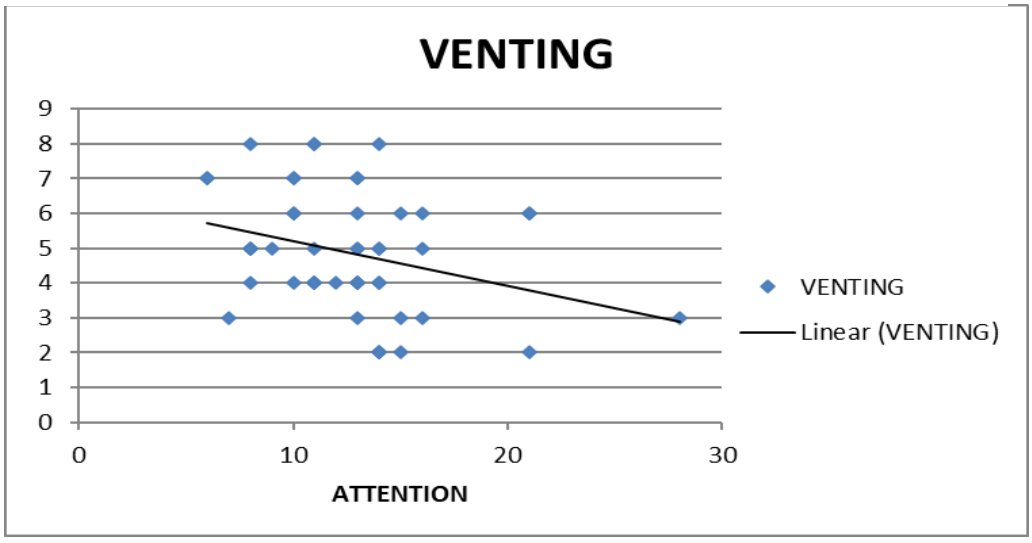


Table 32, correlation between the venting and clinical correlate-depression.

DEPRESSION		
VENTING	Pearson Correlation	-.342*
	p-value	0.015
	N	50

Figure 32, correlation between the venting and clinical correlate-depression.

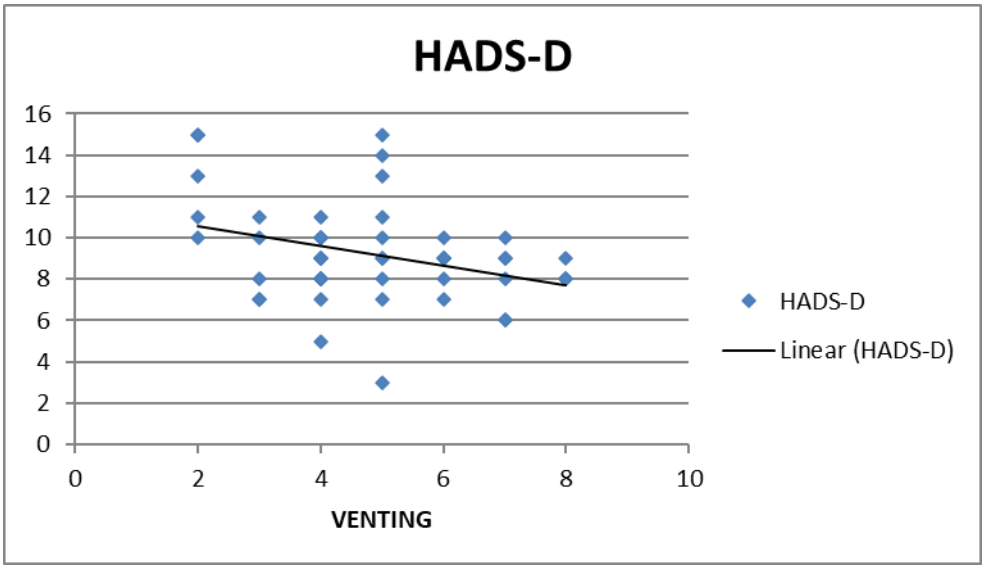


Table 33, shows correlation between Stroop interference and domain of coping- self blame and acceptance.

		SELF BLAME	ACCEPTANCE
INTERFERENCE SCORE	Pearson Correlation	.279*	-.424**
	p-value	0.050	0.002
	N	50	50

Figure 33 shows correlation between Stroop interference and domains of coping- self-blame and acceptance

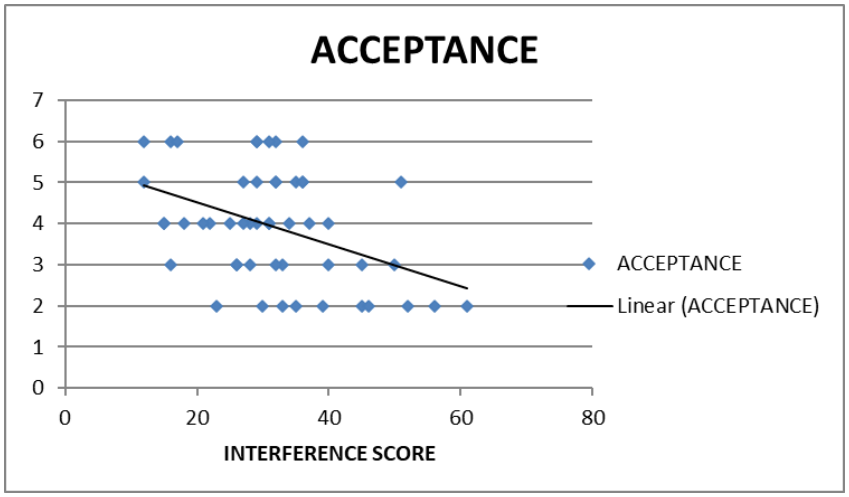


Table 34, shows Gender differences in use of Coping strategies (Avoidant).

	Female		Male		t	p-value
	Female	SD	Male	SD		
AVOIDANT	33.29	1.99	35.63	4.17	-2.491	0.016

Figure 34, shows Gender differences in use of Coping strategies (Avoidant).

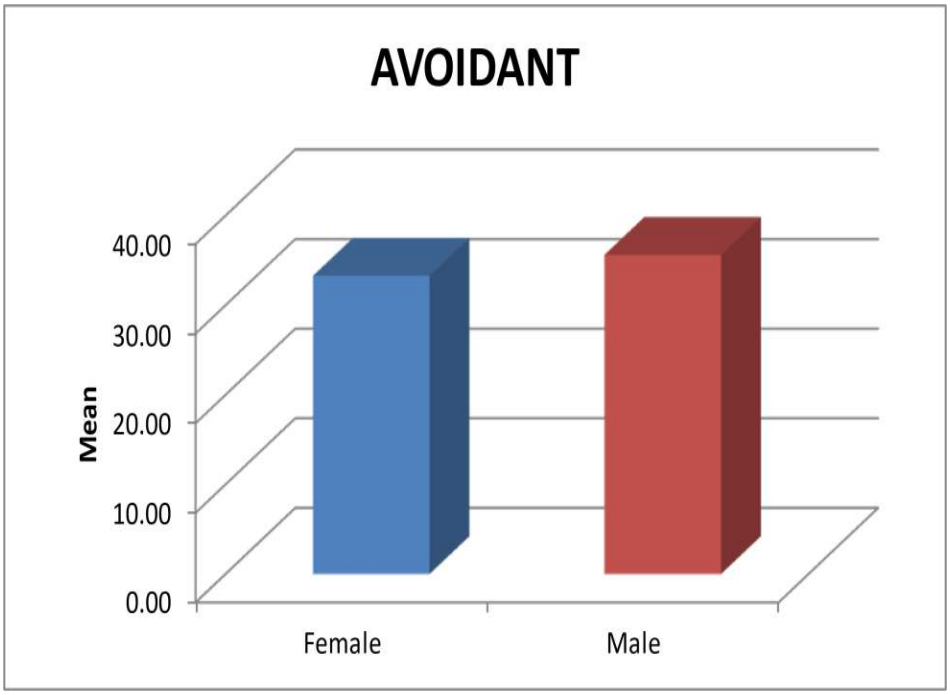


Table 35, shows gender differences in coping strategy as substance use.

	Female		Male		t	p-value
	Female	SD	Male	SD		
SUBSTANCE USE	2.14	0.68	4.25	1.58	-6.252	0.000

Figure 35, shows gender differences in coping strategy as substance use.

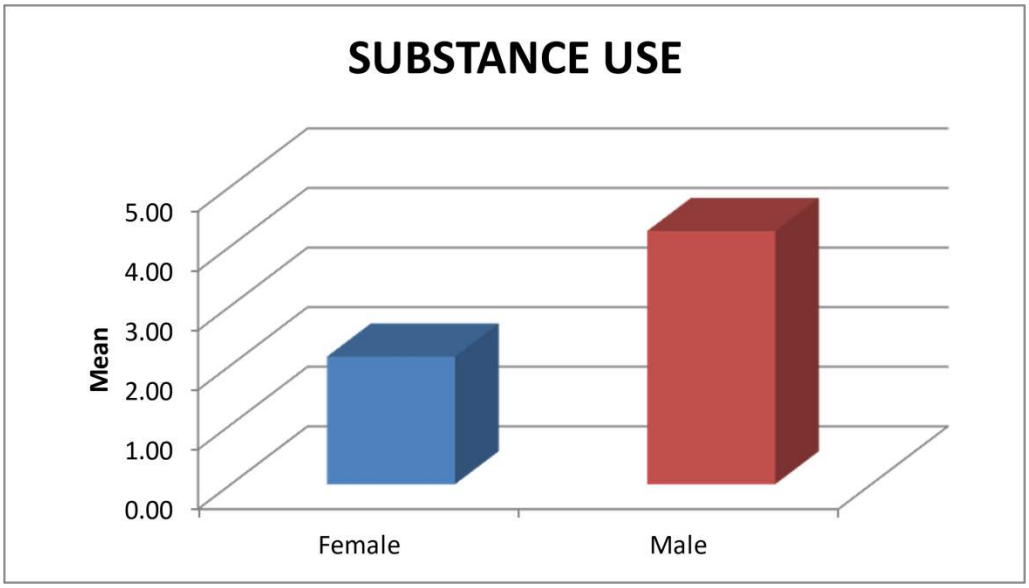
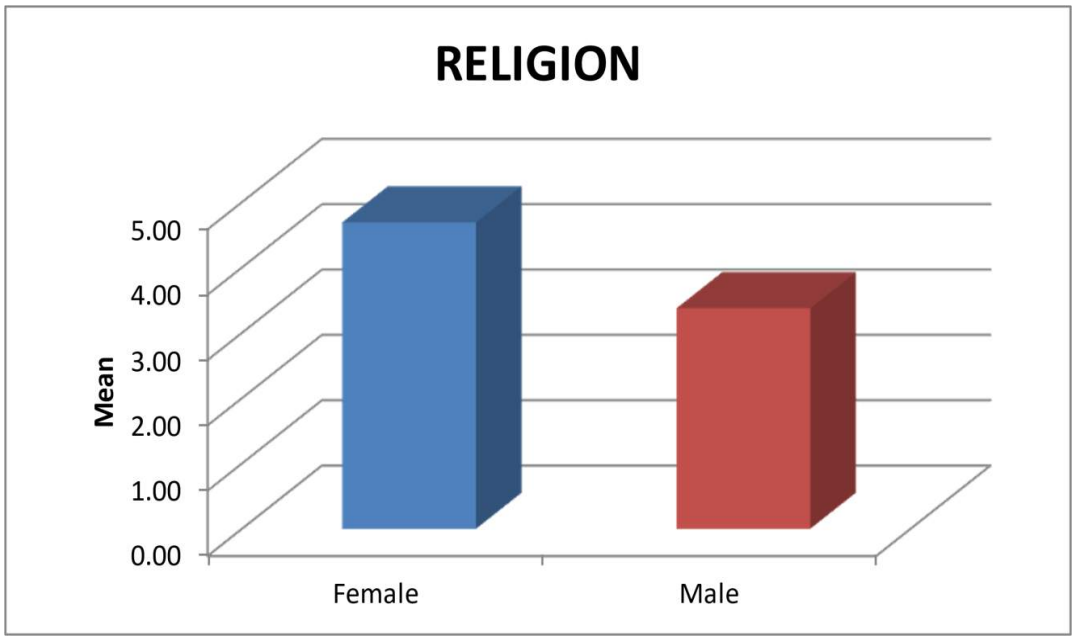


Table 36, shows gender differences in coping strategy as ‘turning to religion.

	Female		Male		t	p-value
	Female	SD	Male	SD		
RELIGION	4.69	1.70	3.38	1.19	2.081	0.043

Figure 36, shows gender differences in coping strategy as ‘turning to religion



RESULTS

The current study was conducted in the department of neurology Dayanand Medical College & Hospital, Ludhiana on subjects diagnosed with Migraine (N=50) and healthy control groups (N=50) with the same socio-demographic data. The subjects were drawn from the OPD of Neurology department. Both the groups were assessed on Executive functioning tests- TMT-A & B, Stroop test, Clock drawing test, Digit span test. They were assessed on Brief-Cope Scale and Hospital Anxiety-Depression Scale.

The data thus collected was tabulated and after analyzing the following results were obtained.

In Table 1, we have tabulated the distribution of different age group between cases (patients) and control groups. The maximum number of patients are found in the age group of > 36 i.e. 44% followed by age group 31-35 (24%) and the maximum number of healthy control groups are also found in the same age group i.e. >36 (44%).

In Table 2, we have tabulated the gender-wise distribution of the cases and control groups. The picture is dominated by female patients i.e.84% of the sample size (N=50) and males (16%)

In Table 3, depicts the distribution of background between cases and control groups. In our study 72% of the patients belong to the urban background and 28% from the rural background

In Table 4, we have studied the distribution of duration of Illness among patients it describes 50% of the patients have Illness since 5-8 years.

In Table 5, we have tabulated the frequency of Migraine attack per week in patients describes frequency of attack more than 2 times per week is 64% and less than 2 times is 36%.

In Table 6 we have studied the comparative distribution of TMT-A Performance in patients and control groups. In our study 74% patients showed deficit in TMT-A performance of the same size (N=50) and in

control groups 6% showed deficit. The variance is significant with p value < 0.05.

In Table 7 we have tabulated the comparative distribution of TMT-B Performance in patients and control groups. We observed 56% of patients showed deficit in TMT-B and no deficits were observed in control groups which is significant with p-value of 0.001

In Table 8,we have compared the distribution of CDT performance on cases and control groups describes 48% of patients have mild deficit on CDT followed by 22% with severe deficit. Whereas in control groups 14% showed deficit and 86% showed good performance. The variance is significant with a p-value< 0.05.

In Table 9, we have tabulated the distribution of attention percentile in cases and control groups. We observed that 64% of cases have below Average memory followed by 16% have low level of working memory. The control groups 4% showed low level of memory indicating a siginificant difference with a p-value 0.001.

In Table 10, we have compared the distribution of forward-attention in cases and control groups. We observed that 24%of cases could go upto 8 digits which is lower than control groups i.e 22% upto 9 digits.

In Table 11, we have compared the distribution of Backward-attention in cases and control groups. We observed that 32 %of cases could go upto 4 digits which is lower than control groups i.e 28% upto 12 digits.

In Table12, our study has explored the mean age of patients is 32.96 and control groups is 31.94 which shows no significant difference.

In Table 13, we have compared the mean value of TMT-A & TMT-B in both patients and control groups. As observed the mean on TMT-A of patients and control groups is 78.42 & 42.98 respectively. For TMT-B is

158.48 & 63.62 respectively. The variance is significant with p-value < 0.05.

In Table 14, we studied the mean of stroop test on naming word, color and color-word of patients and control groups which shows a significant difference with a p value < 0.000.

In Table 15, we tabulated the interference score of stroop test. Larger the interference scores poorer the performance. The observed mean of patients is 31.62 and control group is 9.44. The variance is significant with p value <0.05.

In Table 16, we have compared the mean value of CDT of patients and control groups which is 5.50 & 8.92 respectively which is significant with p-value 0.000.

In Table 17, we tabulated the mean of attention(working memory) of patients and cases is 12.66 & 18.28 respectively. On forward & backward for patients and control groups it is 7.30 & 9.34, 5.36 & 8.94 respectively. The variance is significant with p- value 0.05.

In Table 18, we have compared the mean on Brief-Cope domains Avoidant and Adaptive of patients and control groups showing significant difference at p-value < 0.05. The mean value of Avoidant coping in patients and control groups is 33.66 & 21.00 respectively. For adaptive strategy it is 21.64 & 38.10 for patients and control groups respectively.

In Table 19, we have discussed the different domains of Adaptive Coping on Brief-Coping scale as observed by patients and control groups found a significant p value. The maximum difference of mean of all domains found in all patients, thus the patients use less adaptive coping strategies. The mean of cases and control groups on active coping, emotional support, instrumental support, positive reframing, planning, acceptance, humour, religion is 3.20, 4.00, 4.38, 3.30, 2.84,

3.92, 4.36, 4.48 and 6.28, 6.38, 6.18,6.52, 6.40, 6.34, 5.08, 3.78 respectively.

In Table 20, we have discussed the different domains of Avoidant Coping on Brief-Coping scale as observed by patients and control groups found a significant p value. The maximum difference of mean of all domains except substance use found in all patients, thus the patients have maladaptive coping strategies. The mean of cases and control groups on self-distraction, denial, behavior disengagement, venting and self blame is 6.82, 6.38, 6.60, 4.86, 6.52 and 3.70, 3.16, 4.56, 3.92, 3.08 respectively.

In Table 21, shows intergroup observation of HAD Scale between patients and control groups. The mean value of depression is 9.20 & 5.92 respectively. On anxiety the mean for patients is 10.96 &control groups (7.96). The variance is significant with p- value 0.05.

In Table 22, correlates the relationship between Age and DOI, FoA with pearson's correlation value.418 of duration of illness and -.289 of frequency of attacks indicating more the age, more is the duration of Illness and more the age, lesser will be the FoA respectively.

In Table 23, correlates the relationship between Age & Domain of executive functioning-CDT with pearson's correlation negative value of -.282 respectively shows more the age, poorer the performance on CDT(planning).

In Table 24, we have discussed the correlation between DOI and domains of coping strategies- Venting & acceptance with pearson's negative correlation value -.287 & -.354 shows more the DOI, lesser will be the venting and acceptance in patients with migraine.

In Table 25, we observed the correlation between DOI and clinical correlate- Anxiety with pearson's value .393 shows more the DOI, level of anxiety will be more.

In Table 26, we have discussed the correlation between TMT-A and domain of coping-self blame with Pearson's correlation negative value of-.281 shows more the attention, lesser will be self blame.

In Table 27, correlates the relationship between TMT-A and clinical correlates – Depression with Pearson's correlation negative value of -.281 shows more the attention, lesser will be the level of depression.

In Table 28, we have shown the correlation between TMT-B and domain of coping- substance use with pearson's correlation negative value of -.343 shows more the cognitive flexibility lesser will be the use of substance use.

In Table 29, correlates the relationship between TMT -B and depression with pearson's correlation negative value -.361 which shows more cognitive flexibility, lesser will be the level of depression.

In Table 30, shows correlation between Stroop interference and domains of coping- self blame with correlation value .279 shows more the cognitive inhibition, more of self blame whereas negative pearson's correlation value on acceptance -.424 indicating more the cognitive inhibition, lesser the acceptance in patients with migraine.

In Table 31, correlates the relationship between Attention and domain of coping- venting shows pearson's correlation negative value of -.303 shows more the use of attention, lesser will be the venting.

In Table 32, correlation between the venting and clinical correlate-depression with negative correlation value -.342 indicating more the use of venting, lesser will be the level of depression.

In Table 33, correlates the relationship between stroop interference & Coping strategy- Self blame and acceptance. The correlation value .279 indicating higher the cognitive inhibition, higher will be the use of

self blame. The negative correlation value -.424 reflects lower the cognitive inhibition, higher the use of acceptance.

In Table 34, shows the mean of gender difference in using coping strategies in cases showing significant difference at p-value< 0.05. The mean value of Avoidant in male patients is high compared to female patients i.e 35.63 & 33.29 respectively.

In Table 35, shows the mean of gender difference in using coping strategies in cases showing significant difference at p-value< 0.05. The mean value of substance use in male patients is higher compared to female patients i.e 4.25 & 2.14 respectively.

In Table 36, shows the mean of gender difference in using religion as a coping strategy in cases showing significant difference at p-value< 0.05. The mean value of female patients is high compared to male patients i.e 4.69 & 3.38 respectively.

DISCUSSION

The present study was conducted with the aim to find out whether the patients who are suffering from migraine have any cognitive impairment especially in their executive functioning and coping strategies as compared to the healthy control groups. The secondary aim was to find out its relationship to clinical correlate. Considering all the factors, the study included patients with higher levels of education in order to provide a more definite and generalized findings. A total number of 100 patients(50 in each group) fulfilling the laid down inclusion and exclusion criteria were recruited and assessed with the help Executive functioning test- TMT-A & B, Stroop test, CDT,DST, Brief-Cope Scale and HAD-S. Diagnosis of the study population was made according to the diagnostic criteria of ICHD-3. The data was then analyzed and following conclusions were reached-

SOCIODEMOGRAPHIC CORRELATES

AGE

With regards to age, majority of patients were seen in age group of >36 years (44%) followed by age group between 31-35 years of age(24%). The mean age of cases and control group was 32.96 & 29.96 years respectively in our study. Compared to control groups, cases were bit older in the study by Maria Padilla et al. (2016)[102] [Mean age= 25 ± 4.7 vs 24]. The healthy control groups were matched for sex and age.

GENDER

In our study 84% of the patients were females and 16% were males Compared to males, females were more in the study by Stewart et al.[103] (1999) [Female 75.6 & Male 25%], A study done by Padilla et al.[102] 2016 female 75% and male 25% of patients with migraine. Another study suggested by Antonia Russo et al.[104] (2019) shows mean of gender is 52 Female and 9 Male.

BACKGROUND

In our study 72% of the patients were from urban background and 28% of the patients from rural background. Since the present study was conducted in a tertiary care hospital, which caters largely to the urban population, the pre-ponderance of more subjects from urban locality is understandable.

DURATION OF ILLNESS

Our study showed the mean duration of illness among migraine patients was 50% from 5-8 years, 28% from 1-5 years which is in concordance with in a study held by Sreedhar et al.[105] 2020 where they reported the mean duration of Illness was 5.93 ± 5.20 years in patients with migraine. Padilla et al.[102] (2016) < 5 years (50%) > 5 years (50%) which is in corroboration to our results.

FREQUENCY OF ATTACK

Our study showed frequency of attack more than 2 times per week was 64% and less than 2 times was 36%. Russo et al[104].,2019 showed mean frequency of attack as per days was 5.8± 4.4. Total no. of days with headache 3.6(2.7) mean, SD respectively in a study held by Miya Shaik et al.,2014.[106]

EXECUTIVE FUNCTIONING

In our study we compared executive functioning of patients with migraine and control groups, we found a significant difference. The maximum difference of means of all domains is found in patients and control groups. This was in concordance with a cross sectional clinical based study by Costa-Silva et al.,[107] 2016 where patients with migraine performed mild- moderate and healthy control groups performed good on executive functioning. Another study done by Huang et al[108].,(2017) showed similar results exhibiting migraine patients performed worst on executive functioning.

DOMAINS OF EXECUTIVE FUNCTIONING

TMT-A: which evaluates selective attention and visuomotor tracking

TMT-B: which assesses divided attention and set-shifting.

A significant difference was observed between the performance of patient and control groups on Trail making test in both A & B form. On TMT-A and TMT- B, 74% and 56% respectively patients shows deficit in performance compared to control groups. The current study results are also in corroboration with the earlier-mentioned studies which found significant differences between groups for execution time on the TMT where migraineurs took longer to complete the test. [Costa-Silva et al.,[107]2016].Another study held by Villa et al[109].,2009 and Calandre et al (2002)[110] assesses patients on TMT which measures executive functioning and is associated with selective and divided attention, speed of processing information, and visuomotor tracking reported the deficits in visuomotor tracking and selective attention are consistent with the available data on adults with migraine. A cross-sectional study by Pellegrino Baena et al[111]., 2018 showed poorer performance in Trail Making Test-B in migraine patients suggesting an impairment in executive functions which is in concordance to our study. Another study held by Camarda et al.,[112] 2007 found that the trail making test-B is possibly the test most consistently found to be disturbed in individuals with migraine compared with control groups

STROOP TEST: which assess cognitive inhibition and processing speed with language process.

In our study we found a significant difference in mean of Stroop interferences between patients and control groups which is 31.62 and 9.44 respectively, which indicates larger interference score poorer performance between the sample which is in corroboration with another study held by Ferreira et al.,2016 [113] reporting that the patients with migraine had a poorer performance in Stroop test [Patients and control groups mean= 24.5 &18.8, respectively].

CDT: Clock Drawing Test: which assess planning and visuo-constructive abilities.

We found a significant difference in performance on CDT in both patients and control groups. 48% shows mild difficulty followed by 26% showing severe difficulty indicating poor planning. The mean of cases is 5.50 which is lower than the control groups 8.92 in our study which is in concordance with study by Ferreira etal.,[113] 2016 [Mean = 2.2 & 2.7 in patients and control groups respectively.]

ATTENTION& CONCENTRATION: Digit Span test- which assess the verbal working memory.

In our study we observed the mean attention scores found in patients and control groups were 12.66 and 18.28 respectively. However, the control groups had higher mean value of attention depicting the better verbal memory and attention. This is in concordance with the study by Ferreira et al[113].,2016 [mean=13.0 & 15.8 respectively]in migraine patients and healthy group. Another study by Le Pira et al.,[114] 2000 reported Impaired attention in migraine patients.

BRIEF-COPE: Avoidant and Approach

Our study compiled the scores of various domains of coping strategies in two categories which is adaptive and avoidant. Emotion focused and problem focused are defined as adaptive strategies. The problem-focused strategies of planning, instrumental support and active coping, together with the emotion focused strategies of self-distraction, emotional support and acceptance, were used the most. In our study we have observed the patients had higher mean value of 33.6 in use of avoidant strategies and lower level of adaptive strategies with mean value 21.6 which is in concordance with a study by Siniatchkin et al[115].,1999 the observations suggested that migraine patients are prone to use internally focused coping strategies such as nonverbal complaints, suppressive thoughts, and decreased search for social support suggesting a contracted attitude toward affective support coming from other people. Another study by Martin et al[116]., 1993support these findings where the adults with chronic headaches

score significantly lower on social support, compared to non-headache subjects, Ebrahim et al.,[117] 2014 have similar results showing avoidant strategy used by migraine and tension type headache than non-clinical participants whereas in another study by a study conducted by Russo et al[104]., 2019observed that MwoA patients shows no abnormalities neither in the different dimensions of basic coping strategies which is in contrast to our result.

In our study we observed higher mean value (6.60) of behavioural disengagement domain in patient as compared to control groups (4.56) .The finding are in concordance with another study by Tomasso et al[118].,2014 which reported higher behavioral disengagement in Migraine patients, compared to control groups.

On domain of venting higher mean value of 4.86 inpatient as compared to control groups (3.92). The finding is in contrast with earlier study held by Lanzi[119] et al., 2001found that headache sufferers internalized their feelings.

Mean values on instrumental (4.38) and social support (4.00) are also decreased for the migraine group as compared to the control groups which is 6.18 & 6.38 respectively. The results are supported by the study conducted by Tomasso et al[118].,2014 where the scores on both these domains were reduced in the migraine patients. Another study by Gunel et al[120]., 2008 migraineur patients used the coping way of seeking social support less compared to the control group individuals.

On the domain of religion our study observed a higher mean value 4.48 in migraine patients which is higher than the mean value for control groups which is 3.78 which is in concordance with a study done by Osman et al.,[121] 2014 which showed that migraine patients scored higher on religious coping strategy (mean= 14.68 & 13.38) respectively. Few more studies done by Sica et al[122],2008 and Russo et al[104], 2019 which stated that there's a significantly reduced use of the "turning to religion" approach. Our study showed use of religious coping strategies because for most Indians, faith is important. In a 2015 pew Research

center survey, eight-in-ten Indians said religion is very important in their lives. Few researches, has found that the majority of patients with chronic pain use religious and/or spiritual forms such as prayer and spiritual support for coping with their pain (Dunn et al.,2004) [123]

The mean value of active coping in patients and control groups are 3.20 & 6.28 respectively. Our findings are consistent with the study by Osman et al[121]., 2014 show significant lower scores on active coping when they were compared to migraine and control group groups(mean value= 10.93 & 11.30) respectively. Active coping such as active problem solving, planning, reconceptualize, and self-reliance strategies, are better ways to deal with stressful events.

GENDER DIFFERENCES IN COPING:

Edward et al[124]., 2015 in his study suggested that women in pain are more likely to use coping strategies considered to be maladaptive, resulting in poorer functioning, while men tend to engage in coping strategies considered to be adaptive, leading to better functional outcomes. On the contrary our study found a significant gender difference in mean of avoidant coping strategy. The mean value in males was 35.63 which is higher as compared to the females which was 33.29. Significant gender difference was also found in use of substance use as coping mechanism (maladaptive way) higher in males. In the Indian social context, as the elements of the avoidance scale (alcohol consumption) are more permissible for the male gender, they probably employ this strategy more often.

Whereas the females scored higher mean value in use of religion as coping strategy in contrast to males. The investigator was unable to find a similar relation in studies done earlier on the same population.

CLINICAL CORRELATES: DEPRESSION AND ANXIETY

Our study observed the patient's mean value of depression are 9.20 which is higher than the mean value of control groups 5.92. The results are in corroboration with earlies study done by Chung et al.,2014[125]demonstrated that patients with migraine have high levels

of depression.(Mean=17.75& 12.76) respectively. This finding is consistent with earlier study that highlight the burden of depression in migraine patients by Wieser et al[126].,2012 .

On HADS- Anxiety the mean value of patients are 10.96 &control groups are 7.96 which is lower than the migraine patients. The findings are in corroboration with a study held by Chung et al., 2014[125] highlights on the high level of anxiety on migraine patients &control groups. (Mean=23.56& 13.16) respectively. Another study held by Mario et al[127]., 2017 showed similar results indicating high level of anxiety in migraine compared to non-headache control groups.

CORRELATION BETWEEN AGE AND DURATION OF ILLNESS, FREQUENCY OF ATTACK, CDT

In our study, the relationship between age and duration of illness had shown correlation indicating more the age, more the duration of illness which reflects that onset of migraine tends to take place in early years. Therefore, duration of illness is longer. Early intervention, thereby, can help patients with migraine to prevent severity. The investigator was unable to find a similar relation in studies done earlier.

The relation between age and CDT showed negative correlation. More the age, more the worsening performance on CDT. This was in consistency with the study conducted by Taim[128] et al., 2020 found age and education influence the performance on the CDT.

CORRELATION BETWEEN DURATION OF ILLNESS AND DOMAINS OF COPING STRATEGIES.

Our study shows a negative correlation between duration of illness and domain of adaptive coping strategy i.e. acceptance which reflects that with the increase in the duration of illness there would be decrease in the acceptance adaptive coping. The findings differed from previous study conducted by Büssing[129]et al., 2010 which revealed that duration of illness had no significant impact on the adaptive coping strategies. On the domain of venting our study reflected longer the duration illness, lesser the use of venting which is corroboration with

other study by Lanzin et al[119]., 2001 found that chronic headache sufferers internalized their feelings.

CORRELATION BETWEEN DURATION OF ILLNESS AND DOMAINS OF CLINICAL CORRELATE-ANXIETY.

Our study depicted the relation between duration of illness and anxiety indicating longer the duration of illness, higher the anxiety. The findings are supported by another study by Rammohan[130] et al.,2019where the duration and frequency of migraine headaches were found to correlate with the presence of Higher level of anxiety. A study by Breslau et al[131]., 1998 also reported that migraneurs are 2-5 times more like to have anxiety. Similarly, many studies have confirmed the comorbidity of migraine and anxiety disorders.[132]

CORRELATION BETWEEN DOMAINS OF EXECUTIVE FUNCTIONING AND COPING STRATEGIES.

Our study depicted a negative correlation between domain of executive functioning which are attention, processing speed, cognitive flexibility, inhibition and maladaptive coping strategies i.e self- blame, substance use, venting and unable to accept which is in corroboration with earlier studies done by Shields et al.,[133] 2016 found that stress deteriorates working memory, coginitve flexibility and inhibition. Another study done by Houben[134]et al.,2011 showed better the cognitive inhibition, flexibility and working memory may help at-risk drinker to reduce their impulsive attack. Many other studies by Campbell [135]et al., 2009 & Robinson [136] et al., 2015 found individuals with impaired executive functioning may also demonstrate impairment in the ability to use adaptive approaches to cope with stress. Increase in brain activation in pre-frontal regions in response to working memory task were associated with greater use of secondary control group coping strategies and better psychosocial functioning.

CORRELATION BETWEEN EXECUTIVE FUNCTIONING AND CLINICAL CORRELATES- ANXIETY& DEPRESSION

Our study shows a negative correlation between cognitive flexibility and depression which indicates lower the attention, the level of depression would be high which is in concordance with a study held by Youngjuan[137] et al., 2018 found greater scores depression were associated with lower scores of cognitive flexibility and higher levels of impulsivity. Depression and cognitive flexibility could predict attention impulsivity and non-planning impulsivity. Another study held by Gabrys[138] et al., 2018 suggested that greater cognitive control group/flexibility was associated with more favourable stressor appraisals and effective coping, which in turn, would be predictive of lower levels of depressive symptoms.

CORRELATION BETWEEN COPING STRATEGIES AND CLINICAL CORRELATES

A study done by Materazzo[139] et al., 2000 found migraine patients use less effective coping strategies that can lead to higher level of depression which is in corroboration to our findings reflecting correlation between depression and venting (Avoidant strategy). Other study had indicated coping by “venting,” produced greater levels of anxiety and depression by McPherson [140]et al., 2013 but our study did not show such correlation. Migraine patients internalise their feelings that can produce depression therefore thought ventilation is an adaptive way to cope with stress.

LIMITATIONS OF THE STUDY

1. This study was a hospital based and the findings may not be generalised to the entire population of patients with migraine.
2. The sample size of the study population was small.
3. Not all domains of executive functioning were assessed due to time constraint
4. The patients were not categorised into different types headache.

SUMMARY & CONCLUSION

SUMMARY

The current study was conducted in the department of neurology Dayanand Medical College & Hospital, Ludhiana on subjects diagnosed with Migraine (N=50) and healthy control groups (N=50) with the same socio-demographic data. The subjects were drawn from the OPD of Neurology department. Both the groups were assessed on Executive functioning tests- TMT-A & B, Stroop test, Clock drawing test, Digit span test. They were assessed on Brief-Cope Scale and Hospital Anxiety-Depression Scale. Diagnosis of the study population was made according to the diagnostic criteria of ICHD-3.The data was then analyzed and following conclusions were reached-

- Majority of patients were seen in the age group of > 36 i.e. 44% followed by age group 31-35 (24%). The mean age of patients and control groups is 32.96 31.94 respectively.
- Among the patients 84 % were females and 16% were males.
- 72% of the patients were from urban background and 28% of the patients from rural background.
- Duration of illness since 5-8 years is among 50% of the patients.
- Frequency of Migraine attack more than 2 times per week is among 64% of the patients.
- On TMT-A & B performance, 74% and 56% of the patients showed deficit respectively.
- On CDT, 22% of the patients showed severe deficit followed by 48% showed mild deficits.
- On DST, 64% of the patients have below average memory followed by 16% have low level of memory.
- The patients with migraine performed worse on both TMT-A & TMT-B performance than the healthy control groups.
- A significant difference was observed in the stroop interference score of patients and control groups. Patients performed poorer.

- Better performance was observed on CDT by control groups than patients.
- Patients have poorer attention compared to control groups.
- Patients with migraine use more of Avoidant coping than adaptive ways.
- A significant difference was found on HAD-S of patients and control groups. Patients are high on depression and anxiety.
- Age, duration of illness and frequency of attacks was associated. Thus showed the correlation between age and DOI. Negative correlation between age and frequency of attack was observed.
- Significant associations were found in age, DOI with performance on CDT, coping strategies employed by patients and clinical correlates.
- Significant relations were found among executive functioning, coping strategies and clinical correlates
- Male patients with migraine showed more avoidant strategy with using more of substance use to cope with stress.
- Female patients employed religion as a coping strategy to overcome stress.

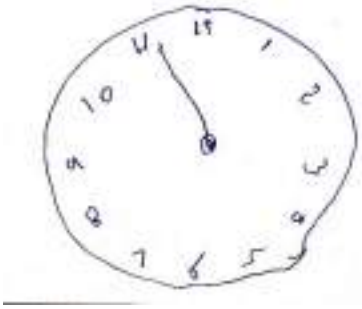
To conclude the present study suggested that patients with migraine showed deficit in executive functioning with maladaptive coping strategies and symptoms of depression & anxiety compared to healthy control group.

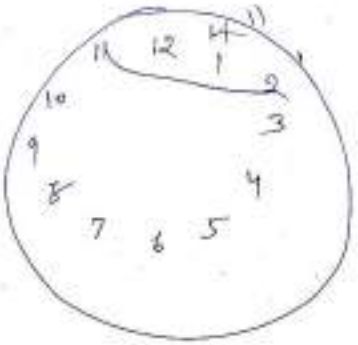
Executive functioning, coping strategies and clinical correlates are an important area of study in migraine. The goal of assessing these domains is that the individuals could receive appropriate cognitive training and have the best opportunity to recover. The findings of the present study indicate that there is a significant correlation among executive functioning, coping strategies and clinical correlates. These domains could be potential targets for cognitive training and for therapeutic intervention. The improvements in these domains may lead to a better daily functioning in patients suffering from migraine.

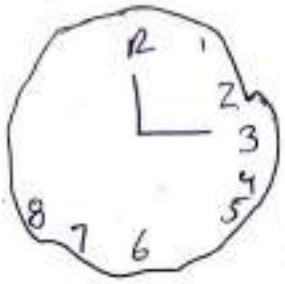
FUTURE DIRECTIONS

The existing data suggest that migraine patients have deficit in executive performance and employ maladaptive coping strategies with presence of depressive and anxiety symptoms. Future studies should consider population based longitudinal studies that can address the question of whether all migraine disorders can lead to cognitive impairment. Lower educational level could be studied as well to analyse whether migraine has a significant effect on executive performance and consequently its association with the employed coping strategies. The assessment of executive function was limited therefore further domain of executive function could be studied. Future research can evaluate executive functioning, coping strategies and psychological distress by applying proper cognitive training with therapeutic intervention to see the pre and post phase of executive performance, adaptive coping and level of distress which would help us to go beyond the treatment of just pain itself.

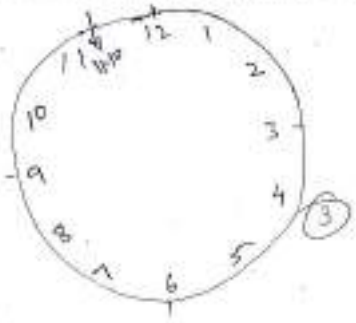
SAMPLES: PERFORMANCE ON CDT IN MIGRAINE PATIENTS.

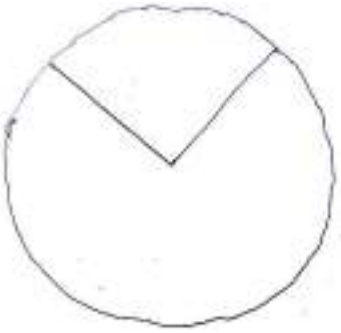


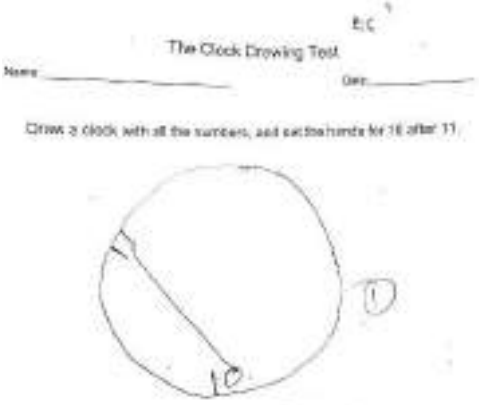




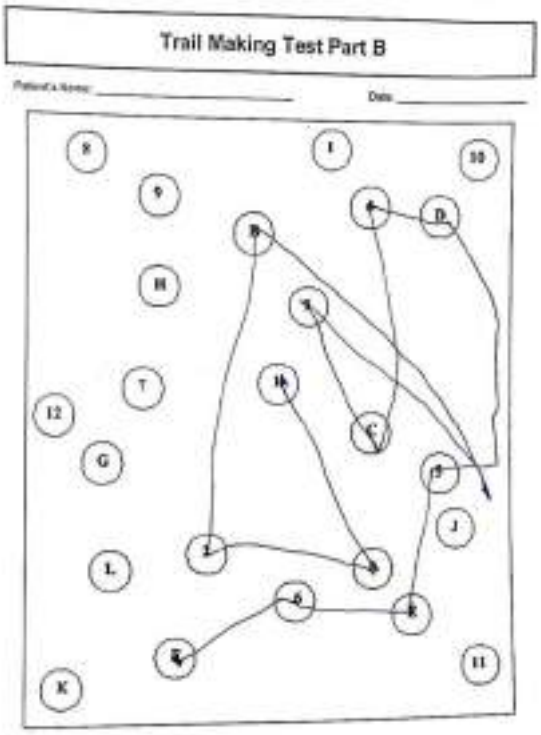
Draw a clock with all the numbers, and set the hands for 10 after 11.

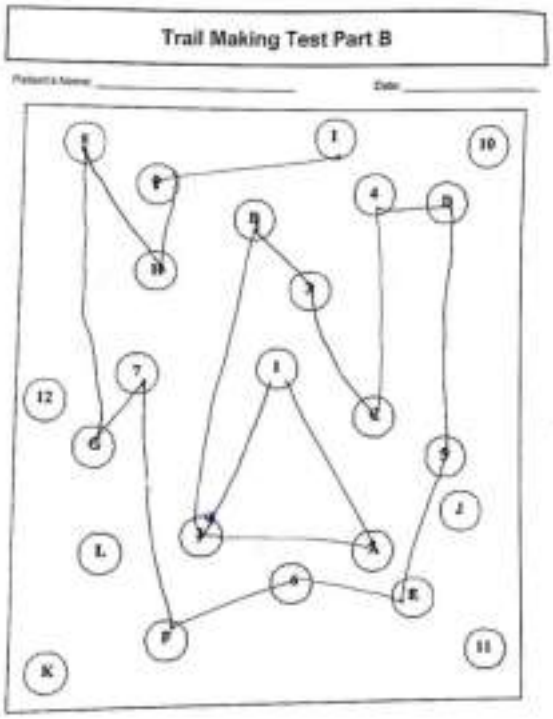


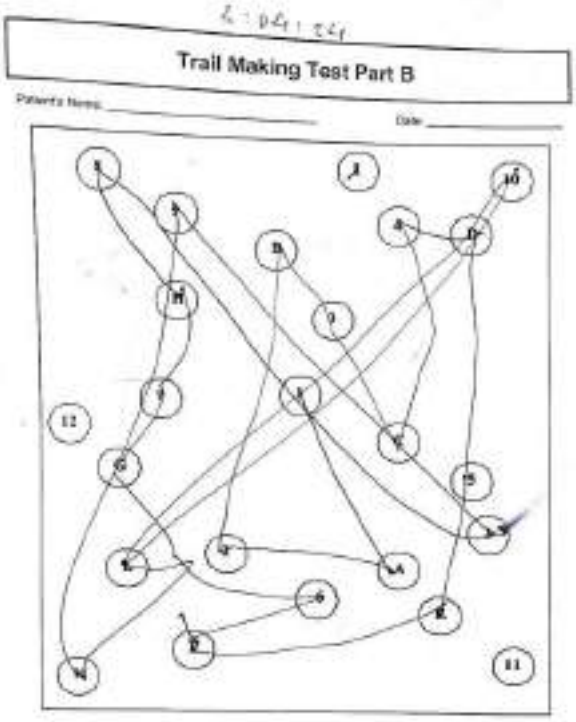




PERFORMANCE ON TRAIL MAKING TEST -B







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MIGRAINE

S.NO	NAME	MRD	AGE	AGE RANGE= 20-25: 1, 26-30:2, 31-35:3, 36-40:4	SEX	EDU	RURAL/URBAN	DOI	DOI= LESS THAN 1 YEAR=1, 1-4 YEARS=2, 5-8 YEARS= 3, GREATER THAN 8=4	FREQUENCY/ WEEK	WITH OR WITHOUT AURA	IN SECONDS				STROOPT	WORD	COLOR	CO-WO	INTERFERENCE SCORE= Larger score poorer performance. (C-CW= INTERFERENCE SCORE)	CDT-0-3 indicates severe difficulty, 4-7 indicates mild difficulty, 8-10 indicates good planning	ATTENTION	Percentile Rank (P1-P20: Low Level memory-1, P20-P40 :Below Average Memory, P40-P60-Average,P60-80:Above average, P90-P100: Excellent)	FORWARD
												TMT-A	DESCRIPTION=AVERAGE-29 SEC, DEFICIT->78SECS	TMT-B	DESCRIPTION= AVERAGE- 75 SECONDS , DEFICIT- > 180									
1	AG	963340	23	1	F	MBBS	URBAN	5 MONTHS	1	4 DAYS	WITHOUT	69	AVERAGE	190	DEFICIT	45	60	38	10	28	9	13	2	9
2	AR	874823	35	3	F	Diploma	RURAL	10 YEARS	4	3 DAYS	WITHOUT	80	DEFICIT	176	AVERAGE	45	80	45	8	37	2	8	1	6
3	CK	27065	35	3	F	MA	RURAL	10 YEARS	4	4 DAYS	WITHOUT	82	DEFICIT	167	AVERAGE	45	75	49	24	25	3	13	2	7
4	GK	947593	38	4	F	MSC	RURAL	7 YEARS	3	4 DAYS	WITHOUT	85	DEFICIT	189	AVERAGE	45	50	32	10	22	4	12	2	4
5	GS	702134	37	4	M	12+	RURAL	4 YEARS	2	2 DAYS	WITHOUT	47	AVERAGE	75	AVERAGE	45	80	46	14	32	5	14	2	8
6	GS	1000673	37	4	M	BA	URBAN	10 YEARS	4	3 DAYS	WITHOUT	30	AVERAGE	85	AVERAGE	45	100	70	25	45	9	8	1	4
7	GK	1002025	36	4	F	MA	RURAL	8 YEARS	3	4 DAYS	WITHOUT	83	DEFICIT	187	DEFICIT	45	89	60	20	40	9	11	2	7
8	G	979978	25	2	F	MPHIL	URBAN	2 YEARS	2	1 DAY	WITHOUT	95	DEFICIT	200	DEFICIT	45	96	76	40	36	10	10	2	8
9	HK	244344	37	4	F	12TH	URBAN	4 YEARS	2	2 DAYS	WITHOUT	95	DEFICIT	190	DEFICIT	45	70	50	21	29	4	11	2	7
10	H	621500	26	2	F	MBA	URBAN	10 YEARS	4	4 DAYS	WITHOUT	85	DEFICIT	190	DEFICIT	45	75	49	16	33	9	13	2	9
11	HG	879056	36	4	M	BCOM	URBAN	6 YEARS	3	2 DAYS	WITHOUT	84	DEFICIT	105	AVERAGE	45	80	50	20	30	10	16	3	10
12	IK	339133	40	4	F	BA	URBAN	5 YEARS	3	3 DAYS	WITHOUT	86	DEFICIT	100	AVERAGE	45	65	34	18	16	4	15	3	9
13	K	6223	20	1	F	B.COM	URBAN	1 YEAR	2	3 DAYS	WITHOUT	82	DEFICIT	185	DEFICIT	45	89	50	21	29	5	10	2	4
14	JK	836837	27	2	F	MBA	URBAN	10 YEARS	4	4 DAYS	WITHOUT	82	DEFICIT	159	AVERAGE	45	95	50	22	28	9	11	2	6
15	KK	973090	34	3	F	MSC	URBAN	9 YEARS	4	4 DAYS	WITHOUT	50	AVERAGE	90	AVERAGE	45	90	60	42	18	4	8	1	4
16	KK	58543	33	3	F	12TH	URBAN	5 YEARS	3	3 DAYS	WITHOUT	90	DEFICIT	189	DEFICIT	45	70	47	26	21	3	8	1	4
17	KK	929686	26	2	F	12TH	URBAN	3 YEARS	2	4 DAYS	WITHOUT	89	DEFICIT	186	DEFICIT	45	85	35	23	12	4	11	2	5
18	KK	988038	38	4	F	MA	RURAL	5 YEARS	3	2 DAYS	WITHOUT	90	DEFICIT	205	DEFICIT	45	80	59	32	27	2	15	3	8
19	KK	998410	33	3	F	PG	URBAN	2 YEARS	2	2 DAYS	WITHOUT	85	DEFICIT	190	DEFICIT	45	95	49	15	34	8	16	3	9
20	KS	901725	33	3	M	BA (Hons)	URBAN	6 YEARS	3	4 DAYS	WITHOUT	88	DEFICIT	190	DEFICIT	45	60	52	25	27	2	15	3	10
21	MK	886696	32	3	M	BSc	URBAN	5 YEARS	3	3 DAYS	WITHOUT	90	DEFICIT	184	DEFICIT	45	84	48	15	33	7	14	2	10
22	M	1006588	34	3	F	BA	URBAN	4 YEARS	2	2 DAYS	WITHOUT	93	DEFICT	215	DEFICIT	45	80	30	18	12	2	13	2	9
23	MS	997255	23	1	F	12+	RURAL	7 YEARS	3	4 DAYS	WITHOUT	80	DEFICIT	200	DEFICIT	45	93	60	20	40	10	13	2	7
24	MK	945249	26	2	F	BCOM	RURAL	4 YEARS	2	5 DAYS	WITHOUT	78	AVERAGE	145	AVERAGE	45	97	76	20	56	1	7	1	3
25	N	553231	40	4	F	Bsc Nurs	URBAN	8 YEARS	3	2 DAYS	WITHOUT	60	AVERAGE	78	AVERAGE	45	95	50	15	35	4	11	2	6
26	NS	553231	40	4	M	MSC	URBAN	6 YEARS	3	2 DAYS	WITHOUT	97	DEFICIT	190	DEFICIT	45	40	24	8	16	6	13	2	8
27	NR	1003611	37	4	F	BSC	RURAL	5 YEARS	3	4 DAYS	WITHOUT	120	DEFICIT	182	DEFICIT	45	60	30	13	17	5	14	2	9
28	PK	983301	39	4	F	MSC	URBAN	8 YEARS	3	2 DAYS	WITHOUT	84	DEFICIT	198	DEFICIT	45	64	45	16	29	7	6	1	4
29	PK	259143	40	4	F	BA	URBAN	7 YEARS	3	1 DAY	WITHOUT	89	DEFICT	190	DEFICIT	45	56	38	7	31	3	14	2	8
30	PK	998649	35	3	F	BA	URBAN	5 YEARS	3	2 DAYS	WITHOUT	40	AVERAGE	80	AVERAGE	45	80	50	18	32	5	21	4	11
31	PD	862984	40	4	F	BA	RURAL	8 YEARS	3	5 DAYS	WITHOUT	90	DEFICIT	189	DEFICIT	45	50	26	11	15	5	13	2	8
32	R	829451	33	3	F	12+	RURAL	13 YEARS	4	3 DAYS	WITHOUT	81	DEFICIT	134	AVERAGE	45	82	45	19	26	3	14	2	8
33	RR	1006623	40	4	F	BA	URBAN	10 YEARS	4	3 DAYS	WITHOUT	85	DEFICIT	190	DEFICIT	45	94	67	22	45	2	10	2	6
34	RR	927651	35	3	F	B.Ed	URBAN	5 YEARS	3	2 DAYS	WITHOUT	75	AVERAGE	100	AVERAGE	45	96	46	14	32	3	10	2	6
35	R	964365	28	2	F	MD	URBAN	2 YEARS	2	2DAYS	WITHOUT	74	AVERAGE	187	DEFICIT	45	69	56	20	36	7	10	2	6
36	SA	495405	24	1	F	MA	URBAN	3 YEARS	2	2 DAYS	WITHOUT	45	AVERAGE	79	AVERAGE	45	86	67	17	50	10	11	2	7
37	S	476538	25	1	F	BSC	URBAN	5 YEARS	3	3DAYS	WITHOUT	80	DEFICIT	145	AVERAGE	45	79	45	22	23	7	8	1	4
38	SK	613807	36	4	F	MSC	RURAL	4 YEARS	2	3 DAYS	WITHOUT	58	AVERAGE	90	AVERAGE	45	95	50	14	36	5	13	2	5
39	S	981360	20	1	M	12+	URBAN	5 YEARS	3	4 DAYS	WITHOUT	83	DEFICIT	120	AVERAGE	45	65	50	19	31	4	16	3	10
40	SK	975643	40	4	F	MSc	URBAN	15 YEARS	5	2 DAYS	WITHOUT	88	DEFICIT	188	DEFICIT	45	80	69	8	61	7	28	5	12
41	SK	987485	27	2	F	BA	URBAN	6 YEARS	5	5 DAYS	WITHOUT	86	DEFICIT	145	AVERAGE	45	82	50	11	39	8	21	4	11
42	SK	988828	20	1	F	12+	RURAL	4YEARS	2	5 DAYS	WITHOUT	30	AVERAGE	187	DEFICT	45	85	78	26	52	4	13	2	8
43	SS	1006588	33	3	M	BSC	URBAN	6 YEARS	5	3 DAYS	WITHOUT	87	DEFICIT	96	AVERAGE	45	90	70	19	51	9	14	2	8
44	SJ	794215	40	4	F	12+	RURAL	13 YEARS	5	3 DAYS	WITHOUT	85	DEFICIT	190	DEFICT	45	96	60	25	35	4	11	2	7
45	SK	1003611	36	4	F	MA	URBAN	6 YEARS	5	2 DAYS	WITHOUT	82	DEFICIT	183	DEFICIT	45	48	68	22	46	9	9	2	7
46	E	42151	30	2	F	BA	URBAN	4 YEARS	2	4 DAYS	WITHOUT	84	DEFICIT	198	DEFICIT	45	64	45	16	29	7	6	1	4
47	S	994661	40	4	F	MA	URBAN	7 YEARS	3	3 DAYS	WITHOUT	89	DEFICT	190	DEFICIT	45	56	38	7	31	3	14	2	8
48	K	988594	39	4	F	MSC	URBAN	3 YEARS	2	4 DAYS	WITHOUT	40	AVERAGE	80	AVERAGE	45	80	50	18	32	5	21	4	11
49	S	207035	40	4	F	BCOM	URBAN	6 YEARS	3	3 DAYS	WITHOUT	90	DEFICIT	189	DEFICIT	45	50	26	11	15	5	13	2	8
50	A	43152	27	2	F	DIPLOMA	URBAN	7 YEARS	3	1 DAY	WITHOUT	81	DEFICIT	134	AVERAGE	45	82	45	19	26	3	14	2	8

S.NO	NAME	MRD	BACKWARD	BRIEF-COPE	AVOIDANT	ADAPTIVE	SELF DISTRACTION	DENIAL	SUBSTANCE USE	BEH..DISEN	VENTING	SELF BLAME	ACTIVE COPING	EMOTIONAL SUPPORT	INSTRUMENTAL SUPPORT	POSITIVE REFRAME	PLANNING	ACCEPTANCE	HUMOUR	RELIGION	HADS-D	HADS-A
1	AG	963340	4	50	32	18	6	7	2	7	5	5	2	5	2	4	2	3	3	5	10	8
2	AR	874823	2	50	31	19	7	6	2	5	5	6	3	4	3	2	3	4	4	4	9	10
3	CK	27065	6	60	36	24	8	7	2	6	6	7	4	3	5	5	3	4	4	7	10	11
4	GK	947593	8	60	38	22	8	8	2	8	4	8	2	7	5	2	2	4	2	2	9	10
5	GS	702134	6	64	42	22	7	7	6	6	8	8	4	5	3	2	2	6	6	3	8	9
6	GS	1000673	4	53	38	15	6	7	5	6	8	6	4	2	3	2	2	2	4	3	9	17
7	GK	1002025	4	59	33	26	6	7	2	7	4	7	3	4	6	6	3	4	7	6	8	12
8	G	979978	2	54	35	19	7	6	2	7	7	6	2	5	2	2	2	6	4	4	6	6
9	HK	244344	4	56	37	19	8	7	2	7	8	5	2	2	3	5	2	5	5	6	8	12
10	H	621500	4	53	32	21	8	7	2	6	3	6	4	5	4	4	2	2	6	4	7	11
11	HG	879056	6	53	33	20	7	6	4	7	3	6	2	6	4	3	3	2	5	2	11	16
12	IK	339133	6	54	34	20	6	6	2	8	6	6	2	2	4	5	4	3	6	6	9	12
13	K	6223	6	54	33	21	6	5	2	7	6	7	3	4	4	2	4	4	5	4	8	8
14	JK	836837	5	51	34	17	7	7	2	6	5	7	2	5	2	2	2	4	2	5	15	15
15	KK	973090	4	57	34	23	7	6	2	6	5	8	3	5	5	4	2	4	6	4	11	13
16	KK	58543	4	46	29	17	6	5	2	7	4	5	2	3	3	3	2	4	5	2	5	8
17	KK	929686	6	56	35	21	6	7	2	7	8	5	2	2	5	2	4	6	3	5	8	15
18	KK	988038	7	62	32	30	5	7	6	6	2	6	3	7	6	6	4	4	6	5	13	11
19	KK	998410	7	52	33	19	6	6	2	6	6	7	2	5	4	2	2	4	2	5	7	10
20	KS	901725	5	58	34	24	8	7	2	7	3	7	4	5	5	3	2	5	6	3	7	12
21	MK	886696	4	50	29	21	7	6	2	7	2	5	3	6	3	2	4	3	3	3	11	12
22	M	1006588	4	57	36	21	6	8	2	7	7	6	3	4	3	3	3	5	5	2	6	6
23	MS	997255	6	52	33	19	6	6	2	7	4	8	4	4	4	2	2	3	5	5	7	12
24	MK	945249	4	49	32	17	7	6	2	6	3	8	2	4	2	2	5	2	4	6	10	8
25	N	553231	5	51	29	22	7	2	4	6	4	6	4	3	4	3	3	5	3	4	11	13
26	NS	553231	5	56	35	21	8	5	5	5	7	5	4	3	4	2	2	6	3	4	8	8
27	NR	1003611	5	56	32	24	8	5	2	6	5	6	4	4	4	2	4	6	4	4	3	16
28	PK	983301	2	64	35	29	7	6	2	7	7	6	5	4	7	5	2	6	6	8	9	10
29	PK	259143	6	56	34	22	7	6	2	8	4	7	3	3	5	3	4	4	3	5	8	9
30	PK	998649	10	57	33	24	6	6	2	7	6	6	4	4	7	2	2	5	5	5	9	10
31	PD	862984	5	54	31	23	6	7	2	6	4	6	2	4	5	6	2	4	4	6	9	8
32	R	829451	6	50	31	19	8	6	2	5	2	8	3	2	6	2	3	3	6	2	15	12
33	RR	1006623	4	52	34	18	7	6	2	7	6	6	3	4	4	2	2	3	3	3	9	18
34	RR	927651	4	49	33	16	6	5	2	6	7	7	2	3	2	3	3	3	2	3	10	14
35	R	964365	4	59	33	26	6	6	2	7	4	8	4	4	4	3	6	5	5	7	8	9
36	SA	495405	4	58	35	23	8	8	2	5	4	8	4	2	8	3	3	3	4	7	10	9
37	S	476538	4	54	33	21	7	6	2	7	5	6	4	5	4	4	2	2	3	7	9	8
38	SK	613807	8	61	36	25	7	7	2	8	5	7	3	2	6	6	3	5	2	5	13	10
39	S	981360	6	58	34	24	7	7	4	5	5	6	5	2	6	2	3	6	7	6	14	12
40	SK	975643	16	49	31	18	6	8	2	6	3	6	4	3	2	3	4	2	6	6	8	10
41	SK	987485	10	54	31	23	8	7	2	5	2	7	2	6	4	5	4	2	4	2	10	12
42	SK	988828	5	56	34	22	6	7	2	8	4	7	4	5	5	4	2	2	5	2	10	12
43	SS	1006588	6	66	40	26	8	8	6	7	5	6	3	7	3	4	4	5	4	3	7	10
44	SJ	794215	4	54	35	19	7	6	2	8	4	8	5	4	2	4	2	2	4	3	10	14
45	SK	1003611	2	56	34	22	6	7	2	7	5	7	4	2	7	4	3	2	3	5	8	11
46	E	42151	2	65	36	29	7	6	2	7	7	7	5	4	7	5	2	6	6	8	9	10
47	S	994661	6	54	32	22	7	6	2	7	4	6	3	3	5	3	4	4	3	5	8	9
48	K	988594	10	57	33	24	6	6	2	7	6	6	4	4	7	2	2	5	5	5	9	10
49	S	207035	5	54	31	23	6	7	2	6	4	6	2	4	5	6	2	4	4	6	9	8
50	A	43152	6	55	33	22	8	6	2	8	2	7	3	5	6	2	3	3	6	2	15	12

S.NO	NAME	AGE	AGE RANGE= 20-25: 1, 26-30:2, 31-35:3, 36-40:4	SEX	EDUCATION	URBAN=1, RURAL=2	TMT-A	DESCRIPTION= AVERAGE-29 SEC, DEFICIT- >78SECS	TMT-B	DESCRIPTION = AVERAGE- 75 SECONDS , DEFICIT- > 180	STROOP TEST	WORD	COLOR	COLOR-WORD	INTERFERENCE	CDT= 0-3 indicates severe difficulty, 4-7 indicates mild difficulty, 8-10 indicates good planning	ATTENTION	PERCENTILE: Percentile Rank (P1-P20: Low Level memory-1, P20-P40 :Below Average Memory, P40-P60-	FORWARD	BACKWARD	BRIEF-COPE	AVOIDANT	ADAPTIVE	SELF DISTRACTION	DENIAL
1	A	36	4	M	PHD	2	30	AVERAGE	60	AVERAGE	45	98	94	82	12	10	21	4	12	9	61	21	40	5	2
2	A	40	4	F	BA	2	45	AVERAGE	79	AVERAGE	45	100	96	89	7	9	24	4	10	14	69	27	42	4	4
3	A	24	1	F	MSC	2	55	AVERAGE	85	AVERAGE	45	87	87	80	7	10	18	3	8	10	69	26	43	6	6
4	A	37	4	M	BTECH	2	38	AVERAGE	56	AVERAGE	45	90	86	79	7	9	24	4	12	12	62	24	38	2	3
5	A	25	1	F	MPHIL	2	27	AVERAGE	39	AVERAGE	45	79	78	70	8	10	18	3	10	8	63	30	33	5	4
6	A	36	4	M	PHD	2	29	AVERAGE	49	AVERAGE	45	83	79	69	10	8	18	3	11	7	62	23	39	7	2
7	A	40	4	F	BFA	2	30	AVERAGE	46	AVERAGE	45	98	92	85	7	7	19	3	6	13	56	25	31	4	4
8	A	22	1	F	BSC	1	16	AVERAGE	29	AVERAGE	45	99	96	83	13	10	21	4	6	15	70	28	42	4	3
9	A	25	1	F	MPHIL	1	18	AVERAGE	59	AVERAGE	45	76	69	54	15	10	20	4	10	10	68	35	33	8	2
10	B	28	2	F	MA	1	27	AVERAGE	38	AVERAGE	45	87	77	70	7	9	19	3	4	15	53	25	28	6	3
11	D	32	3	F	LLB	1	37	AVERAGE	25	AVERAGE	45	77	75	67	8	7	28	5	12	16	61	22	39	3	2
12	DA	26	2	F	MD	1	45	AVERAGE	28	AVERAGE	45	89	86	80	6	8	16	3	10	6	63	24	39	3	2
13	DA	32	3	F	MD	1	55	AVERAGE	39	AVERAGE	45	98	88	82	6	10	18	3	10	8	57	18	39	6	3
14	DC	24	1	F	MD	1	37	AVERAGE	68	AVERAGE	45	65	58	38	20	10	17	3	10	7	63	22	41	3	5
15	DD	38	4	F	MD	1	28	AVERAGE	89	AVERAGE	45	89	79	75	4	9	26	5	12	14	60	18	42	2	3
16	DG	31	3	F	MD	1	36	AVERAGE	98	AVERAGE	45	94	92	89	3	8	23	4	12	11	66	26	40	5	2
17	DJ	28	2	F	MD	1	48	AVERAGE	76	AVERAGE	45	98	98	94	4	9	14	2	8	6	63	17	46	4	2
18	DK	40	4	F	MD	1	45	AVERAGE	64	AVERAGE	45	85	80	76	4	9	19	3	6	13	53	16	37	2	3
19	DP	34	3	M	DM	1	27	AVERAGE	90	AVERAGE	45	80	74	69	5	10	11	2	4	7	58	25	33	6	2
20	DP	38	4	F	MD	1	37	AVERAGE	56	AVERAGE	45	94	94	88	6	10	18	3	10	8	59	22	37	3	5
21	DT	26	2	F	MD	1	17	AVERAGE	39	AVERAGE	45	98	91	82	9	9	23	4	12	11	54	20	34	2	3
22	H	26	2	F	MA	1	13	AVERAGE	56	AVERAGE	45	88	78	59	19	10	17	3	8	9	62	20	42	3	2
23	I	35	3	F	BTECH	1	27	AVERAGE	48	AVERAGE	45	82	60	39	21	10	17	3	10	7	61	18	43	2	2
24	J	24	1	F	MPHIL	1	20	AVERAGE	50	AVERAGE	45	87	73	69	4	10	12	2	7	5	59	19	40	3	3
25	K	26	2	F	BSC	1	80	DEFICIT	170	AVERAGE	45	78	76	64	12	9	21	4	12	9	62	20	42	3	2
26	K	26	2	M	BCOM	1	65	AVERAGE	160	AVERAGE	45	69	52	39	13	7	9	2	6	3	55	21	34	6	3
27	M	29	2	F	PHD	1	45	AVERAGE	60	AVERAGE	45	90	79	70	9	8	6	1	4	2	53	18	35	3	2
28	M	38	4	F	BED	1	50	AVERAGE	50	AVERAGE	45	92	83	78	5	10	21	4	12	9	59	23	36	4	3
29	N	37	4	F	MCOM	1	24	AVERAGE	29	AVERAGE	45	89	72	66	6	8	16	3	9	7	54	18	36	6	2
30	N	28	2	F	MSC	1	30	AVERAGE	37	AVERAGE	45	85	82	79	3	10	15	3	8	7	46	14	32	3	2
31	N	37	4	M	MBA	1	46	AVERAGE	50	AVERAGE	45	79	50	39	11	9	20	4	10	10	52	18	34	2	3
32	N	28	2	F	BCOM	1	50	AVERAGE	28	AVERAGE	45	87	76	65	11	8	7	1	4	3	50	16	34	3	3
33	N	35	3	M	BSC	1	38	AVERAGE	30	AVERAGE	45	83	78	70	8	6	21	4	12	9	50	17	33	2	4
34	P	32	3	F	MA	1	70	AVERAGE	40	AVERAGE	45	96	87	82	5	8	26	5	12	14	60	21	39	2	6
35	PL	36	4	F	CA	2	56	AVERAGE	53	AVERAGE	45	95	81	75	6	9	14	2	8	6	61	25	36	6	4
36	R	40	4	F	BCOM	1	28	AVERAGE	60	AVERAGE	45	90	85	72	13	10	19	3	10	9	56	28	28	3	8
37	S	38	4	M	BCOM	2	36	AVERAGE	58	AVERAGE	45	89	87	60	27	7	17	3	8	9	60	21	39	5	3
38	S	36	4	F	BBA	1	50	AVERAGE	45	AVERAGE	45	76	74	64	10	10	14	2	8	6	50	17	33	3	2
39	S	26	2	F	CA	2	65	AVERAGE	120	AVERAGE	45	57	67	59	8	7	18	3	9	9	54	14	40	2	2
40	S	37	4	F	MSC	1	78	AVERAGE	50	AVERAGE	45	78	69	55	14	9	13	2	7	6	59	17	42	2	3
41	S	39	4	M	PHD	1	79	DEFICIT	130	AVERAGE	45	90	94	89	5	8	20	4	10	10	61	20	41	2	5
42	S	25	1	F	12TH	1	80	AVERAGE	120	AVERAGE	45	94	90	81	9	8	20	4	11	9	59	17	42	3	2
43	S	36	4	F	MPHIL	1	45	AVERAGE	50	AVERAGE	45	85	83	79	4	10	23	5	12	11	64	22	42	4	6
44	T	36	4	F	MPHIL	1	56	AVERAGE	90	AVERAGE	45	99	82	59	23	9	21	4	10	11	61	22	39	5	4
45	T	25	1	F	MPHIL	1	76	AVERAGE	120	AVERAGE	45	91	79	66	13	7	14	2	9	5	57	18	39	3	4
46	U	38	4	M	BBA	1	30	AVERAGE	28	AVERAGE	45	90	84	77	7	9	17	3	10	7	52	14	38	3	2
47	V	25	1	F	MPHIL	1	84	DEFICT	70	AVERAGE	45	87	69	48	21	10	21	4	12	9	65	21	44	2	3
48	V	36	4	F	MA	1	19	AVERAGE	68	AVERAGE	45	95	75	71	4	10	22	4	12	10	67	24	43	4	4
49	V	37	4	F	MA	1	29	AVERAGE	49	AVERAGE	45	82	74	68	6	10	17	3	10	7	60	16	44	4	2
50	A	24	1	F	PHD	1	50	AVERAGE	50	AVERAGE	45	99	73	66	7	9	21	4	12	9	56	17	39	2	2

S.NO	NAME	AGE	SUBSTANCE USE	BEH..DISEN	VENTING	SELF BLAME	ACTIVE COPING	EMOTIONAL SUPPORT	INSTRUMENTAL SUPPORT	POSITIVE REFRAME	PLANNING	ACCEPTANCE	HUMOUR	RELIGION	HADS-D	HADS-A
1	A	36	2	4	6	2	7	8	8	6	7	4	4	4	7	8
2	A	40	4	6	7	2	8	8	5	7	6	8	6	2	6	7
3	A	24	2	3	5	4	8	8	6	8	7	6	8	3	4	5
4	A	37	2	6	8	3	6	8	6	7	7	4	8	2	6	4
5	A	25	4	7	6	4	4	5	7	6	5	6	6	6	5	3
6	A	36	2	4	4	4	6	6	8	4	8	7	8	3	8	7
7	A	40	4	5	5	3	3	4	4	4	8	8	4	2	11	10
8	A	22	5	6	6	4	8	8	7	7	5	7	6	2	5	7
9	A	25	6	8	8	3	7	2	7	2	7	8	4	6	6	8
10	B	28	2	6	6	2	6	2	3	7	2	8	6	5	4	7
11	D	32	2	5	8	2	7	6	6	8	4	8	6	3	7	8
12	DA	26	3	4	7	5	7	4	8	7	5	8	6	5	8	10
13	DA	32	2	2	3	2	8	5	8	7	6	5	7	3	5	12
14	DC	24	3	3	4	4	6	6	6	8	7	8	8	3	7	15
15	DD	38	2	2	6	3	8	6	7	5	8	8	2	2	4	7
16	DG	31	2	5	8	4	8	7	8	4	6	7	6	2	3	8
17	DJ	28	2	4	3	2	8	8	8	7	9	6	3	6	6	15
18	DK	40	2	5	2	2	5	8	6	7	6	5	4	5	7	6
19	DP	34	2	6	7	2	3	4	8	6	5	7	8	3	8	7
20	DP	38	2	7	3	2	7	3	6	7	6	8	6	4	6	8
21	DT	26	4	5	3	3	5	6	7	3	5	8	8	2	8	7
22	H	26	2	6	3	4	7	7	5	8	8	7	6	2	5	8
23	I	35	3	4	2	5	6	6	8	8	7	8	5	2	7	4
24	J	24	2	6	2	3	6	8	8	6	6	6	2	6	4	2
25	K	26	4	7	2	2	8	8	8	7	8	3	7	5	7	3
26	K	26	2	5	2	3	4	8	5	5	8	4	4	8	6	7
27	M	29	3	4	4	2	5	5	4	6	7	8	3	7	12	16
28	M	38	5	7	2	2	8	8	2	8	4	6	2	5	6	7
29	N	37	2	4	2	2	8	8	2	6	4	8	8	4	7	5
30	N	28	2	2	2	3	7	6	2	4	6	7	5	2	4	3
31	N	37	2	3	5	3	6	4	7	7	6	4	4	2	3	8
32	N	28	2	4	2	2	8	7	5	8	4	2	6	2	2	6
33	N	35	2	2	5	2	7	6	4	6	7	3	4	5	2	4
34	P	32	2	2	3	6	6	7	6	7	7	6	7	2	2	6
35	PL	36	4	5	2	4	7	7	4	5	8	5	6	4	5	4
36	R	40	3	6	3	5	5	3	4	4	4	8	8	2	4	6
37	S	38	2	4	4	3	7	8	4	8	5	7	4	3	7	8
38	S	36	2	3	5	2	5	8	3	8	5	4	3	4	5	6
39	S	26	2	4	2	2	5	8	7	7	8	5	5	4	7	7
40	S	37	2	5	3	2	7	5	8	7	8	7	2	3	4	6
41	S	39	2	5	4	2	6	6	8	7	7	7	3	4	6	8
42	S	25	2	4	2	4	6	7	7	8	6	8	3	6	7	9
43	S	36	4	4	2	2	4	6	8	8	8	8	2	4	8	10
44	T	36	2	5	2	4	5	6	6	8	7	7	2	3	5	15
45	T	25	2	2	3	4	2	7	8	8	8	6	8	2	11	14
46	U	38	2	3	2	2	6	7	6	7	7	5	5	4	7	10
47	V	25	2	6	2	6	7	8	8	8	8	5	7	6	5	7
48	V	36	2	6	5	3	8	8	8	7	5	7	3	7	8	9
49	V	37	2	3	2	3	8	7	7	7	7	8	3	5	4	13
50	A	24	2	4	2	5	5	8	8	6	8	4	3	3	5	18

Baba Farid University
of Health Sciences
Sadiq Road
Faridkot-151 203 (Pb). INDIA.
Phone : 01639-256232,256236
Tele/Fax : 01639-256235
Email – Examination@bfuhs.ac.in

No. BFUHS/2K21p-TH/ 627 Date 13/2/21

The Principal,
DMC,Ludhiana

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 22.01.2021 has approved the plan of thesis of Dr. Tanya Sharma, a student of your college for **M.Phil. (Clinical Psychology)** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
To evaluate and find relationship among executive functioning, coping strategies and clinical correlates in patients with migraine

Supervisor
Dr. Bholeshwar Prasad Mishra
Prof. & Head,
Dept. of Clinical Psychology,

Co-Supervisor
Dr. Rajinder Bansal
Prof.,
Dept. of Neurology,
DMCH, Ludhiana.

Ms. Palak Upadhyay
Asst. Prof.,
Dept. of Clinical Psychology,

The student has to submit the three copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,(if any).

Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

4. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.*

Tanya.

TO EVALUATE AND FIND RELATIONSHIP AMONG EXECUTIVE FUNCTIONING, COPING STRATEGIES AND CLINICAL CORRELATES IN PATIENTS WITH MIGRAINE

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

M.PHIL

in

CLINICAL PSYCHOLOGY

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

(JUNE, 2020)

TANYA SHARMA

DEPARTMENT OF CLINICAL PSYCHOLOGY
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	"TO EVALUATE AND FIND RELATIONSHIP AMONG EXECUTIVE FUNCTIONING, COPING STRATEGIES AND CLINICAL CORRELATES IN PATIENTS WITH MIGRAINE"
For the degree of	MPHIL. CLINICAL PSYCHOLOGY
Name of the candidate	MS. TANYA SHARMA
Supervisor	DR. BHOLESHWAR PRASAD MISHRA
Co-supervisor	DR. RAJINDER BANSAL PALAK UPADHYAY
Institution	Dayanand Medical College & Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Migraine is a common primary headache due to a genetic predisposition of episodic activation and sensitization of the trigeminovascular pain pathway. Studies revealed that executive dysfunction in migraineurs which affecting their academic, occupational functioning, and also to overall quality of life. Coping is defined as the process of executing a response to a stressor, where stress is viewed as the experience of encountering relevant difficulties in one's goal-related efforts and exists when an individual perceives the achievement of a desired goal as impossible or detects possible future punishments Psychological distress has also been reported to be high among patients with chronic migraine. Researches indicates the presence of these disorders, leads to cognitive dysfunctioning.

Aim of Study: To evaluate and find relationship among executive functioning, coping strategies and clinical correlates in patients with migraine.

2. To compare executive functioning, coping strategies and clinical correlates in patient with and without migraine (control group)

Materials & methods: The study will be conducted on patients with migraine presenting to DMC& Hospital and without migraine (control group), evaluation will be done using Executive functioning test, Brief-Cope Inventory and Hospital anxiety and depression scale.

Clinical Significance: The significance of the present study lies in the fact that it tends to find out whether the patients who are suffering from migraine have any cognitive impairment, especially in executive functioning and its relationship with coping strategies and clinical correlates

Keywords: Migraine, Executive functioning, Coping strategies, Clinical correlates.

Tanya.
(Signature)
Candidate

(Signature)
Co-supervisor

(Signature)
Supervisor

(Signature)
Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled "**To evaluate and find relationship among executive functioning, coping strategies and clinical correlates in patients with Migraine**" exist in the Department of Neurology, Dayanand Medical College & Hospital, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis are genuine and is collected by the candidate himself/herself under our supervision and guidance.

Supervisor

Dr. Bholeshwar Prasad Mishra
Professor and Head
Department of Clinical Psychology
DMCH, Ludhiana

Co-Supervisor

Dr. Rajinder K Bansal
Professor
Department of Neurology
DMCH, Ludhiana

Palak Upadhyay
Assistant Professor
Department of Clinical Psychology
DMCH, Ludhiana

Dr. Bholeshwar Prasad Mishra
Professor & Head
Clinical Psychology Department
DMCH, Ludhiana

DR. B.P. MISHRA
Professor & Head
Dept. of Clinical Psychology
DMCH, Ludhiana

Place : LUDHIANA

Date : 30·6·2020

APPROVAL PROFORMA
BY
RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

Name of candidate	TANYA SHARMA
Department	CLINICAL PSYCHOLOGY
Topic of Thesis	TO EVALUATE AND FIND RELATIONSHIP AMONG EXECUTIVE FUNCTIONING, COPING STRATEGIES AD CLINICAL CORRELATES IN PATIENTS WITH MIGRAINE
Date of enrollment	
Name of Head of Department	Dr. Bholeshwar Prasad Mishra
1) Supervisor **2) Co-Supervisor**	Dr. Bholeshwar Prasad Mishra Dr. Rajinder Bansal Palak Upadhyay
Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
Dr. Jaspal Singh (Professor & Head, Surgery)	Mr. A K Jindal (Member, Ethics Committee)
Dr. Dinesh Gupta (Professor & Head, Medicine)	Dr. Anu Sharma (Professor, Anatomy)
Dr. Sandeep Kaushal (Assistant Dean Academics)	Dr. Deepinder K Chhina (Professor & Head, Microbiology)
Dr. Rajoo Singh Chhina (Dean Academics)	Dr. Neena Sood (Professor & Head, Pathology)
Dr. Gurpreet S Wander (Vice Principal)	Dr. Gurpreet S Wander (Vice Principal)
	Dr. Gagandeep Singh (Secretary, Ethics Committee Professor & Head, Neurology)

Approved : Yes / No

Chairperson
Research Committee

Approved : Yes / No

Chairperson
Ethics Committee

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

1	NAME OF THE CANDIDATE AND ADDRESS	Ms. TANYA SHARMA R-16 NEW COLONY GURGAON, 122001, HARYANA
2	NAME OF THE INSTITUTE	DAYANAND MEDICAL COLLEGE AND HOSPITAL, LUDHIANA (PUNJAB)
3	COURSE OF STUDY AND SUBJECT	M.PHIL CLINICAL PSYCHOLOGY
4	DATE OF ADMISSION OF COURSE	23rd August 2019
5	TITLE OF THE TOPIC	TO EVALUATE AND FIND RELATIONSHIP AMONG EXECUTIVE FUNCTIONING, COPING STRATEGIES AND CLINICAL CORRELATES IN PATIENTS WITH MIGRAINE

6 BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Migraine is an extraordinarily common, chronic, intermittently disabling, and usually inherited neurovascular disorder. Patients with this condition typically suffer severe headache accompanied by autonomic symptoms.

It is the second most common cause of headache, afflicts approximately 15% of women and 6% of men over a 1-year period. Migraine has become a main leading Cause of disability. It is usually an episodic headache associated with certain features such as sensitivity to light, sound, or movement; nausea and vomiting often accompany the headache. (Hauser, S.L. (2013). Harrison's Neurology in Clinical Medicine. McGraw Hill Education).

Executive functions are complex, higher order processes moderated primarily by the frontal lobe, specifically the prefrontal cortex. The complexity of executive function has made a universally accepted definition elusive, but attention (focusing on relevant information and ignoring distractors), working memory (maintaining and manipulating information until execution), and motor planning (goal-directed motor planning and programming) are generally considered key executive functions. (A.B. Sereno, M.S. Bolding Neuroscience and Bio-behavioural Psychology 2017).

Executive functions (EFs; also called executive control or cognitive control) refer to a family of top-down mental processes needed when you have to concentrate and pay attention, when going on automatic or relying on instinct or intuition would be ill-advised, insufficient, or impossible (Burgess & Simons 2005, Espy 2004, Miller & Cohen 2001).

Studies have addressed cognitive abnormalities in migraine patients outside headache attacks[1] Research has revealed that migraines may actually have a long-standing impact on the brain's overall structure, especially if they are coupled with an aura[2] Psychological distress has also been reported to be high among patients with chronic migraine. Researches indicates the presence of these disorders, leads to cognitive dysfunctioning[3] There have few studies in migraine indicating the role of executive functioning and little is known about this in Indian context.

Studies have indicated cognitive changes in patients with migraine.[4-9] There is evidence that adults with migraine may present deficits in attention, processing speed (reaction time), verbal memory, working memory, and verbal skills. Regarding other cognitive domains, such as visual memory and visuospatial/constructional skills, results are more conflicting. Few studies have assessed the impact of migraine parameters, such as episode frequency and duration, on cognitive performance, and results have failed to show any significant influence of these factors.[4-6,10-12]

Coping is defined as the process of executing a response to a stressor, where stress is viewed as the experience of encountering relevant difficulties in one's goal-related efforts [13] and exists when an individual perceives the achievement of a desired goal as impossible or detects possible future punishments.[14] Thus, coping has been described as an individual's attempt to use cognitive and behavioural strategies to manage and regulate pressures, demands, and emotions in response to stress.[15]

Studies investigated that migraine patients are prone to use internally focused coping strategies such as nonverbal complaints, suppressive thoughts, and decreased search for social support suggesting a contracted attitude toward affective support coming from other people.[16]

The varying components of executive functions can be seen to extend to the cognitive abilities and external behaviors fundamental to coping (Eisenberg, Fabes, & Guthrie, 1997; Lazarus & Folkman, 1984; Weisz, 1990).

Executive functions may either enhance or interfere with the selection and effective implementation of coping strategies, and thereby impact psychological adjustment (Compas & Boyer, 2001; Wadsworth, Raviv, Compas, & Connor-Smith, 2005)

Studies point toward a strong connection between EF impairment and multiple mental disorders including depression (Snyder, 2013), and anxiety (Moran, 2016). Research studies have shown that both EF and coping affect psychological adjustment, Andreotti et al. (2013) found that working memory, cognitive reappraisal, and secondary control coping were each significantly associated with symptoms of anxiety and depression.

6.2 REVIEW OF LITERATURE

Sreedhar et al, 2020 found that migraine group to have deficits in some aspects of problem-solving and concept formation competencies in comparison with healthy individuals and also found strong and weak correlation with various clinical variables such as its severity, duration, and headache impact indicating the role of migraine on cognitive functioning.[17]

Russo et al. 2019, revealed that MwoA patients show a significantly reduced use of the "turning to religion" approach, an emotion-focused coping strategy. Although migraine patients appeared to be less oriented to transcendent (that means a reduced utilization of an adaptive coping strategy), they did not perceive daily living as more stressful than HCs. Finally, the reduced utilization of the "turning to religion" coping strategy is associated with a great impact of migraine on ability to function on the job or at school, at home, and in social situations in migraine patients.[18]

Viviana Lo et al, 2018 found that Migraine patients without Aura Migraine showed a significant difference in comparison to healthy controls in semantic verbal fluency, delayed memory and set-shifting. Migraine with aura showed a significant difference in delayed memory and set-shifting if compared to healthy controls. No significant correlation between cognitive functions and mood was found (HAM-A $p = 0.67$) (BDI-II $p = 0.42$).[19]

According to a recent large genome-wide association study, when compared to other neurological disorders, migraine showed a higher genetic correlation with psychiatric disorders suggesting common genetic bases or pathways.[20]

Silva et al. 2016 found adolescents with migraine had worse performance on tests evaluating short- and long-term verbal memory, attention, executive function, and speed of processing information than controls.[21]

A population based study found impairment in cognitive functions in migraine patients. In the first one with 61 migraine patients, 50 non-migraine headache patients and 367 headache-free controls ,migraine sufferers performed worse in a task of sustained attention and processing speed, which are related to the activation and integrity of prefrontal cortex.[22]

A population based study revealed significantly poorer performance in Trail

Making Test version B in migraine patients, suggesting an impairment in executive functions, processing speed and attention.[23]

A study showed that the persistency to maladaptive pain coping strategies was a risk factor for recurrent relapses in chronic migraine.[24]

A study suggested that migraine patients are prone to use internally focused coping strategies such as nonverbal complaints, suppressive thoughts, and decreased search for social support suggesting a contracted attitude toward affective support coming from other people.[25]

Research studies that have examined the relation between EF and coping have found that better performance on EF tasks is associated with greater use of engagement coping and less disengagement coping.[26]

Research studies that have tested a moderation model have found support for coping playing a protective role as well as increasing risk for anxiety and/or depression. For example, in a study with adults with multiple sclerosis, coping (active coping and avoidant coping) was found to moderate the relation between performance on cognitive tasks (EF measures) and depression, such that for individuals who reported low levels of adaptive coping or high levels of avoidance coping, cognitive dysfunction put them at increased risk of depression.[27]

6.3 AIMS AND OBJECTIVES OF THE STUDY

To study the executive functioning, coping and clinical correlates among patients with migraine and without migraine (control group)

1) To study the different coping strategies utilized by patients with migraine and without migraine.

2) To evaluate executive functioning in patients with migraine and without migraine.

3) To assess clinical correlates in patients with migraine and without migraine.

4) To assess a relation between executive function and coping strategies in patients with migraine and without migraine.

5) To compare executive functioning, coping strategies and clinical correlates in patients with migraine and without migraine.

7 MATERIALS AND METHODS

7.1 SOURCE OF DATA

Study will be conducted on patients with migraine presenting to Neurology OPD, DMC&H, Ludhiana.

7.2 METHOD OF COLLECTION OF DATA

SAMPLE COLLECTION- The study would include 50 patients with Migraine and 50 without Migraine (control group) in age group 20-40 years to the department of Neurology in DMC& Hospital, Ludhiana.

INCLUSION CRITERIA:

1. Patients diagnosed with migraine with aura, without aura according to the International Classification of Headache Disorders. The current version, the ICHD-3 Beta.
2. Age group between 20-40 years.
3. Subjects with a formal education of at least 12+ years
4. Subjects willing to give informed consent.

EXCLUSION CRITERIA :

1. Patient with any neurosensory deficits, communication problems, developmental disabilities such as Intellectual disability.
2. Behavioral disorders such as addiction to drugs and alcohol

INCLUSION CRITERIA (Control group)

1. Individuals not diagnosed with Migraine
2. Age group between 20-40 years
3. Subjects with a formal education of at least 12+ years

EXCLUSION CRITERIA (Control group)

1. Individuals with any other chronic illness
2. Subjects with no history of psychiatric illness.

METHODOLOGY

The study will be conducted on 50 patients of Migraine and 50 without Migraine (control group). Socio-demographic Proforma will be filled containing the basic information about the patient and the subjects will be evaluated on the EXECUTIVING FUNCTIONING test by using Digit span test, Stroop test, Trail-making test and Clock Drawing Test, coping strategies employed by them by administering BRIEF COPE INVENTORY and Hospital anxiety and depression

scale (HAD-S) to determine the levels of anxiety and depression that a person is experiencing.

TOOLS:

1. Soci-Demographic proforma
2. Executing functioning test
3. Brief cope inventory
5. Hospital anxiety and depression scale

EXECUTIVE FUNCTIONING TEST:

A detailed evaluation for executive functions using neuropsychological tests :

Trail Making Test (TMT) :

Consist of 25 circles distributed over a sheet of paper. In Part A, the circles are numbered 1 – 25, and the patient should draw lines to connect the numbers in ascending order. In Part B, the circles include both numbers (1 – 13) and letters (A – L); as in Part A, the patient draws lines to connect the circles in an ascending pattern, but with the added ask of alternating between the numbers and letters (i.e., 1-A-2-B-3-C, etc.). The patient should be instructed to connect the circles as quickly as possible, without lifting the pen or pencil from the paper. Time the patient as he or she connects the "trail." If the patient makes an error, point it out immediately and allow the patient to correct it. Errors affect the patient's score only in that the correction of errors is included in the completion time for the task.

Stroop Test- to assess the ability to inhibit cognitive interference that occurs when the processing of a specific stimulus feature impedes the simultaneous processing of second stimulus attribute. It contains one sheet of color task and color –word stimulus sheet.

Clock Drawing Test: used for screening for cognitive impairment as a measure of planning, spatial dysfunction and neglect. Scoring is descriptive by observation task. Main aspects to consider are

1. Correct spacing with even spaces between numbers
2. correct placement of all numbers and correct placement of hands (10 after 11) time: 11:10

Digit Span (Forward and Backward) – VAIS, PGI-BBD: to assess working memory. Scoring: Total of Raw score converted into T.Q.

2. **BRIEF COPE**: The Brief COPE is an abbreviated version of the COPE Inventory given by Carver in 1997. The instrument efficiently measures 14 coping

mechanisms with 28 items (two items for each coping process).

Scoring-Responses are scored on a 4-point scale that indicates how much the respondent has used the coping strategy depicted by the item:-

1-I haven't been doing this at all.

2-I've been doing this a little bit.

3-I've been doing this a medium amount.

4-I've been doing this a lot.

The COPE assesses some strategies that, in past research on coping, have been found to be adaptive (active coping, use of emotional support, use of instrumental support, positive reframing, planning, humor, acceptance, and religion), and some strategies that have been found to be maladaptive (self-distraction, denial, substance use, behavioral disengagement, venting, and self-blame).Brief COPE was developed on the basis of item reduction procedures, it probably shares in the validity previously established for the longer measure. Cronbach's alphas for the Brief COPE sub-scales range from 0.50 to 0.90.

3. **Hospital Anxiety and Depression Scale** (**HADS**) was originally developed by Zigmond and Snaith (1983) and is commonly used by doctors to determine the levels of anxiety and depression that a person is experiencing. The HADS is a fourteen item scale that generates: 7 of the items relate to anxiety and 7 relate to depression, HADS used in assessing severity and caseness of anxiety disorders and depression in both somatic, and psychiatric cases and in primary care patients and the general population"

Scoring:

Total score: Depression (D) _____ Anxiety (A) _____

0-7 = Normal

8-10 = Borderline abnormal (borderline case)

11-21 = Abnormal (case)

OUTCOME

The present study could help us know whether migraine patients have a different nature of executive functioning deficits. Also if there's any effect on coping due to executive functioning deficits would provide researcher more idea in tailoring various measures. The findings of the present study would definitely add to enrich the existing fund. Direct and practical implications for therapeutic planning and implementation in treating existing cognitive deficits. At the same time their

remedial may help to prevent further deficits and impairments in psychological and social functioning so that the quality of life is not compromised.

STATISTICAL ANALYSIS

Data will be described in terms of range; mean ±standard deviation (± SD), frequencies (number of cases) and relative frequencies (percentages) as appropriate. Comparison of quantitative variables between the study groups will be done using Student t-test and Mann Whitney U test for independent samples for

parametric and non-parametric data respectively. For comparing categorical data, Chi square ($\chi 2$) test will be performed and exact test was used when the expected frequency is less than 5. Pearson correlation will be done. A probability value (p value) less than 0.05 will be considered statistically significant. All statistical calculations will be done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS ? IF SO, PLEASE DESCRIBE BRIEFLY.

NO

7.4 HAS ETHICAL CLEARENCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3 ?

Yes Attached herewith

8. LIST OF REFERENCES

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PROFORMA

SOCIO-DEMOGRAPHIC PROFORMA

S.No :

1. NAME:-

2. MRD NO:

3. AGE:- 1) 20-24 2) 25-29 3) 30-34 4) 35-40

4. SEX:- MALE/ FEMALE

5. MARITAL STATUS: 1) Single 2) Married 3) Remarried 4) Widowed
5) Divorced 6) Separated 7) Other 8) Not known

6. OCCUPATION: 1) Unemployed 2) Unskilled worker 3) Semi-skilled worker
4) Skilled worker 5) Professional 6) House-wife/ Household
7) Student

7. EDUCATION:- 1) Illiterate 2) Primary 3) Middle 4) 10^{th}
5) 12^{th}/ Diploma 6) Graduate 7) Post-graduate

8. EDUCATION HEAD OF THE FAMILY

1) Professional degree 2) Graduate/Post-Graduate 3) Intermediate
4) High School 5) Middle School 6)Primary School
7) Illiterate

Signature of Candidate

Signature pf Supervisor

9. OCCUPATION HEAD OF THE FAMILY

1) Professional 2)Semi-Professional 3)Clerical, shop-owner/Farm

4) Skilled worker 5) Unskilled worker 6) Unemployed

10. INCOME:- 1) < 2,640 2) 2,641- 7,886 3) 7,887-13,160

4) 13,161-19,758 5) 19,759 -26,354 6) 26,355-52,733

6) >52,734

11. CONTACT N0:

12. ADDRESS : 1)Urban 2) Rural

SCLAES

1. EXECUTIVE FUNCTIONING:

a) Trail Making Test: **Part A** Average(29 seconds) Deficient (>78 seconds) 1 min 3 sec

Part B Average(75 seconds) 1 Min 25 sec Deficient (>273 seconds) 4min 55 sec

b) Stroop Test:

c) Digit- Span: 1) Above average 2) Average 3) Below Average 4) Borderline

5) Mild 6) Moderate 7) Severe 8) Profound

d) Clock Drawing Test:

2. BRIEF-COPE :

Signature of Candidate

Signature pf Supervisor

3. **Hospital Anxiety and Depression Scale (HADS) :**

Total score: Depression (D) _____ Anxiety (A) _____

0-7 = Normal
8-10 = Borderline abnormal (borderline case)
11-21 = Abnormal (case)

Signature of Candidate

Signature pf Supervisor

STROOP

Name: _____ Location: _____

Age: _____ Date of Birth: _____ Sex: _____ Date: _____

FOR PROFESSIONAL USE ONLY

	Raw Score	T-Score
Word Score (W)*		
Color Score (C)		
Color-Word Score (CW)		
Interference Score (CW-C)		

Note: A larger interference score means poorer performance.

DO NOT OPEN THE BOOKLET UNTIL YOU ARE INSTRUCTED TO DO SO!

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GREEN	GREEN	RED	BLUE	GREEN
BLUE	RED	BLUE	GREEN	RED
GREEN	BLUE	RED	RED	BLUE
RED	RED	GREEN	BLUE	GREEN
BLUE	GREEN	BLUE	GREEN	RED
RED	BLUE	GREEN	BLUE	GREEN
BLUE	GREEN	RED	GREEN	RED
GREEN	RED	BLUE	RED	BLUE
BLUE	GREEN	GREEN	BLUE	GREEN
GREEN	RED	BLUE	RED	RED
RED	BLUE	RED	GREEN	BLUE
GREEN	RED	BLUE	RED	GREEN
BLUE	BLUE	RED	GREEN	RED
RED	GREEN	GREEN	BLUE	BLUE
BLUE	BLUE	RED	GREEN	RED
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Brief COPE

	I haven't been doing this at all	I've been doing this a little bit	I've been doing a medium amount	I've been doing this a lot
1. I've been turning to work or other activities to take my mind off things	☐	☐	☐	☐
2. I've been concentrating my efforts on doing something about the situation I'm in	☐	☐	☐	☐
3. I've been saying to myself "this isn't real".	☐	☐	☐	☐
4. I've been using alcohol or other drugs to myself feel better.	☐	☐	☐	☐
5. I've been getting emotional support from others.	☐	☐	☐	☐
6. I've been giving up trying to deal with it.	☐	☐	☐	☐
7. I've been taking action to try to make the situation better.	☐	☐	☐	☐
8. I've been refusing to believe that it has happened.	☐	☐	☐	☐
9. I've been saying things to let my unpleasant feeling escape.	☐	☐	☐	☐
10. I've been getting help and advice from other people.	☐	☐	☐	☐
11. I've been using alcohol or	☐	☐	☐	☐

other drugs to help me get through it				
12. I've been trying to see it in a different light, to make it seem more positive.	☐	☐	☐	☐
13. I've been criticizing myself.	☐	☐	☐	☐
14. I've been trying to come up with a strategy about what to do.	☐	☐	☐	☐
15. I've been getting comfort and understanding from someone.	☐	☐	☐	☐
16. I've been giving up the attempt to cope.	☐	☐	☐	☐
17. I've been looking for something good in what is happening.	☐	☐	☐	☐
18. I've been making jokes about it.	☐	☐	☐	☐
19. I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.	☐	☐	☐	☐
20. I've been accepting the reality of the fact that it has happened.	☐	☐	☐	☐
21. I've been expressing my negative feelings.	☐	☐	☐	☐
22. I've been trying to find comfort in my religion or spiritual beliefs.	☐	☐	☐	☐
23. I've been trying to get advice or help from other people about	☐	☐	☐	☐

what to do.

24. I've been learning to live with it. ☐ ☐ ☐ ☐

25. I've been thinking hard about what steps to take. ☐ ☐ ☐ ☐

26. I've been blaming myself for things that happened. ☐ ☐ ☐ ☐

27. I've been praying or meditating. ☐ ☐ ☐ ☐

28. I've been making fun of the situation. ☐ ☐ ☐ ☐

The Clock Drawing Test Instructions

General Information: Provide the patient with an 8.5 x 11-in. blank sheet of paper and a pencil.

Set-up: Equipment required includes a blank sheet of paper, a sheet of paper with a clock on one side, a pen, and a chair/table for ease of drawing.

Patient Instructions (Rouleau, Salmon et al. 1992):
The following instructions are given:

> "I would like you to draw a clock, put in all the numbers, and set the hands for 10 after 11."

Following this condition, the patients should be instructed to copy, as accurately as possible, a clock from a model. The model should contain all the numbers on the clock, be 3 inches in diameter, and located on the upper part of an 8.5 x 11-inch sheet of paper. The hands on the model should be set for 10 after 11. The patient is then instructed to copy the model on the lower part of the same sheet of paper.

- Instructions can be repeated if necessary
- Patients may use their non-dominant hand for drawing the clock

Downloaded from www.rehabmeasures.org
Test instructions derived from reference.

The Clock Drawing Test

Name:_____ Date:_____

Draw a clock with all the numbers, and set the hands for 10 after 11.

Downloaded from www.rehabmeasures.org
Test instructions derived from reference.

Reference:

Rouleau, I., D. P. Salmon, et al. (1992). "Quantitative and qualitative analyses of clock drawings in Alzheimer's and Huntington's disease." Brain Cogn 18(1543577): 70-87.

Downloaded from www.rehabmeasures.org
Test instructions derived from reference.

Hospital Anxiety and Depression Scale (HADS)

Tick the box beside the reply that is closest to how you have been feeling in the past week.
Don't take too long over you replies: your immediate is best.

D	A		D	A	
		I feel tense or 'wound up':			**I feel as if I am slowed down:**
	3	Most of the time	3		Nearly all the time
	2	A lot of the time	2		Very often
	1	From time to time, occasionally	1		Sometimes
	0	Not at all	0		Not at all
		I still enjoy the things I used to enjoy:			**I get a sort of frightened feeling like 'butterflies' in the stomach:**
0		Definitely as much		0	Not at all
1		Not quite so much		1	Occasionally
2		Only a little		2	Quite Often
3		Hardly at all		3	Very Often
		I get a sort of frightened feeling as if something awful is about to happen:			**I have lost interest in my appearance:**
	3	Very definitely and quite badly	3		Definitely
	2	Yes, but not too badly	2		I don't take as much care as I should
	1	A little, but it doesn't worry me	1		I may not take quite as much care
	0	Not at all	0		I take just as much care as ever
		I can laugh and see the funny side of things:			**I feel restless as I have to be on the move:**
0		As much as I always could		3	Very much indeed
1		Not quite so much now		2	Quite a lot
2		Definitely not so much now		1	Not very much
3		Not at all		0	Not at all
		Worrying thoughts go through my mind:			**I look forward with enjoyment to things:**
	3	A great deal of the time	0		As much as I ever did
	2	A lot of the time	1		Rather less than I used to
	1	From time to time, but not too often	2		Definitely less than I used to
	0	Only occasionally	3		Hardly at all
		I feel cheerful:			**I get sudden feelings of panic:**
3		Not at all		3	Very often indeed
2		Not often		2	Quite often
1		Sometimes		1	Not very often
0		Most of the time		0	Not at all
		I can sit at ease and feel relaxed:			**I can enjoy a good book or radio or TV program:**
	0	Definitely	0		Often
	1	Usually	1		Sometimes
	2	Not Often	2		Not often
	3	Not at all	3		Very seldom

Please check you have answered all the questions

Scoring:

Total score: Depression (D) _____ Anxiety (A) _____

0-7 = Normal

8-10 = Borderline abnormal (borderline case)

11-21 = Abnormal (case)

Trail Making Test (TMT) Parts A & B

Instructions:

Both parts of the Trail Making Test consist of 25 circles distributed over a sheet of paper. In Part A, the circles are numbered 1 – 25, and the patient should draw lines to connect the numbers in ascending order. In Part B, the circles include both numbers (1 – 13) and letters (A – L); as in Part A, the patient draws lines to connect the circles in an ascending pattern, but with the added task of alternating between the numbers and letters (i.e., 1-A-2-B-3-C, etc.). The patient should be instructed to connect the circles as quickly as possible, without lifting the pen or pencil from the paper. Time the patient as he or she connects the "trail." If the patient makes an error, point it out immediately and allow the patient to correct it. Errors affect the patient's score only in that the correction of errors is included in the completion time for the task. It is unnecessary to continue the test if the patient has not completed both parts after five minutes have elapsed.

Step 1: Give the patient a copy of the Trail Making Test Part A worksheet and a pen or pencil.

Step 2: Demonstrate the test to the patient using the sample sheet (Trail Making Part A – *SAMPLE*).

Step 3: Time the patient as he or she follows the "trail" made by the numbers on the test.

Step 4: Record the time.

Step 5: Repeat the procedure for Trail Making Test Part B.

Scoring:

Results for both TMT A and B are reported as the number of seconds required to complete the task; therefore, higher scores reveal greater impairment.

	Average	Deficient	Rule of Thumb
Trail A	29 seconds	> 78 seconds	Most in 90 seconds
Trail B	75 seconds	> 273 seconds	Most in 3 minutes

Sources:

- Corrigan JD, Hinkeldey MS. Relationships between parts A and B of the Trail Making Test. *J Clin Psychol*. 1987;43(4):402–409.
- Gaudino EA, Geisler MW, Squires NK. Construct validity in the Trail Making Test: what makes Part B harder? *J Clin Exp Neuropsychol*. 1995;17(4):529-535.
- Lezak MD, Howieson DB, Loring DW. *Neuropsychological Assessment*. 4th ed. New York: Oxford University Press; 2004.
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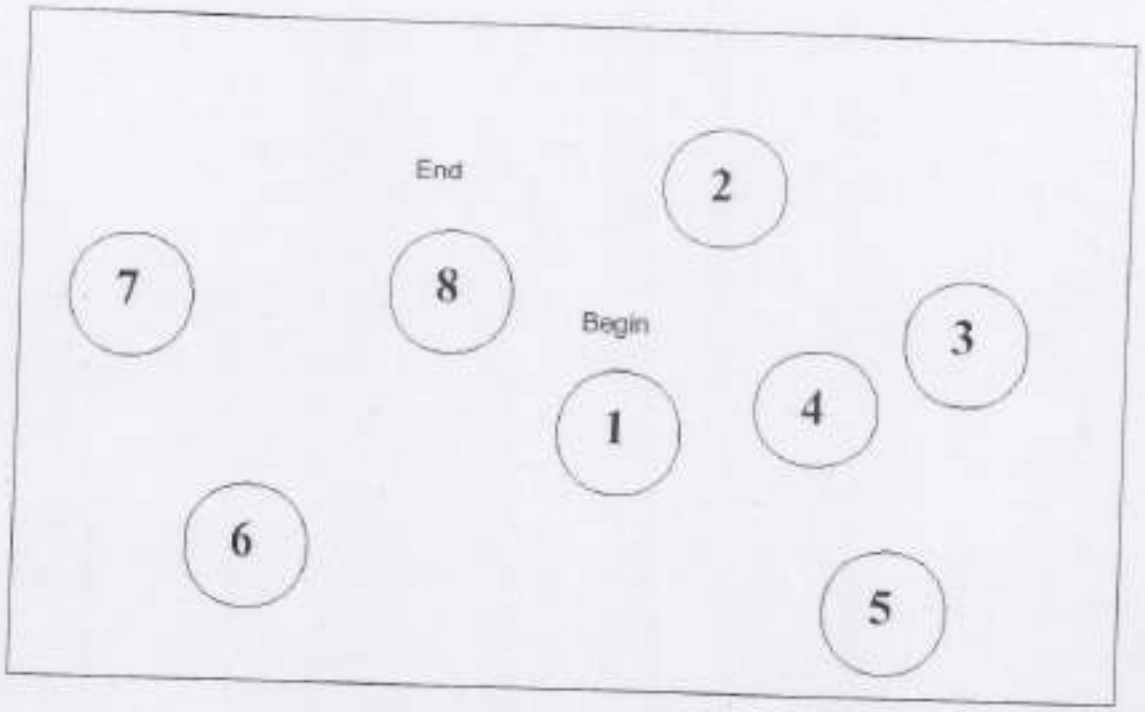
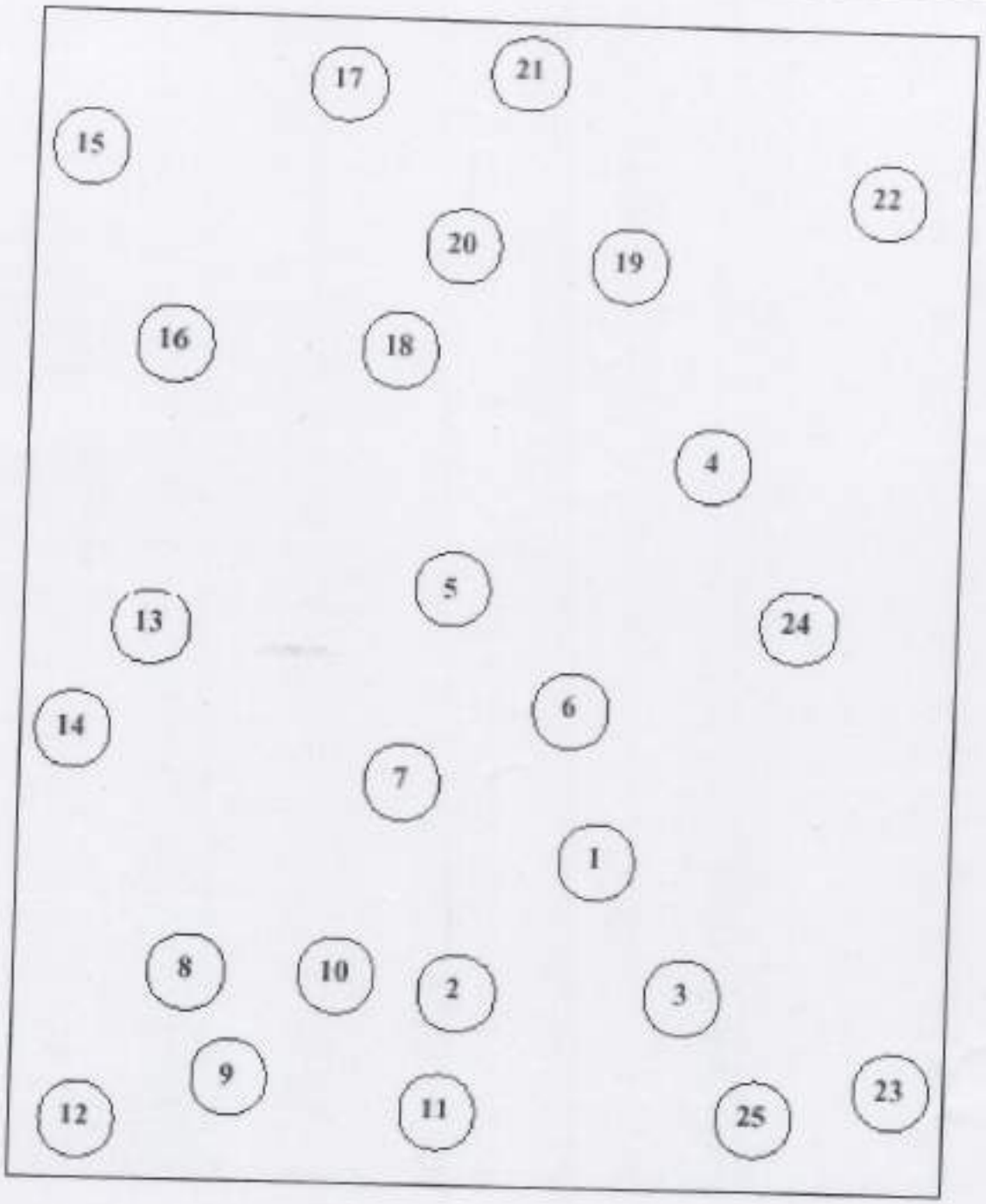
Trail Making Test Part A – *SAMPLE*

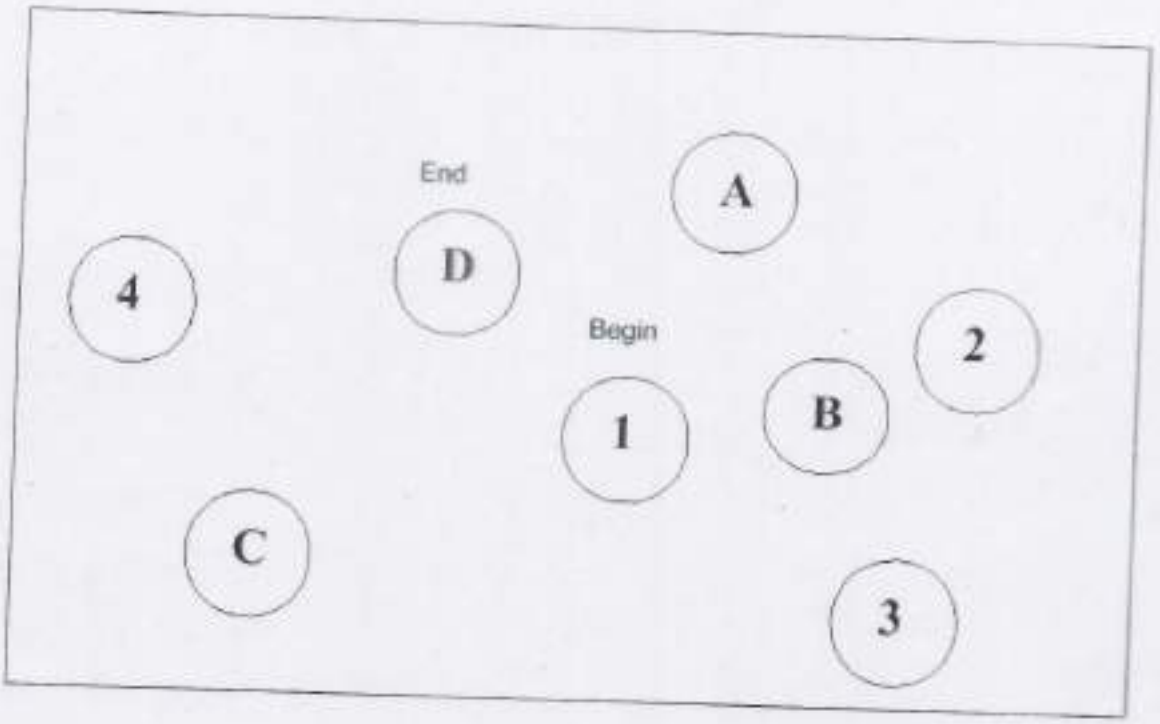


Trail Making Test Part A

Patient's Name: _____ Date: _____

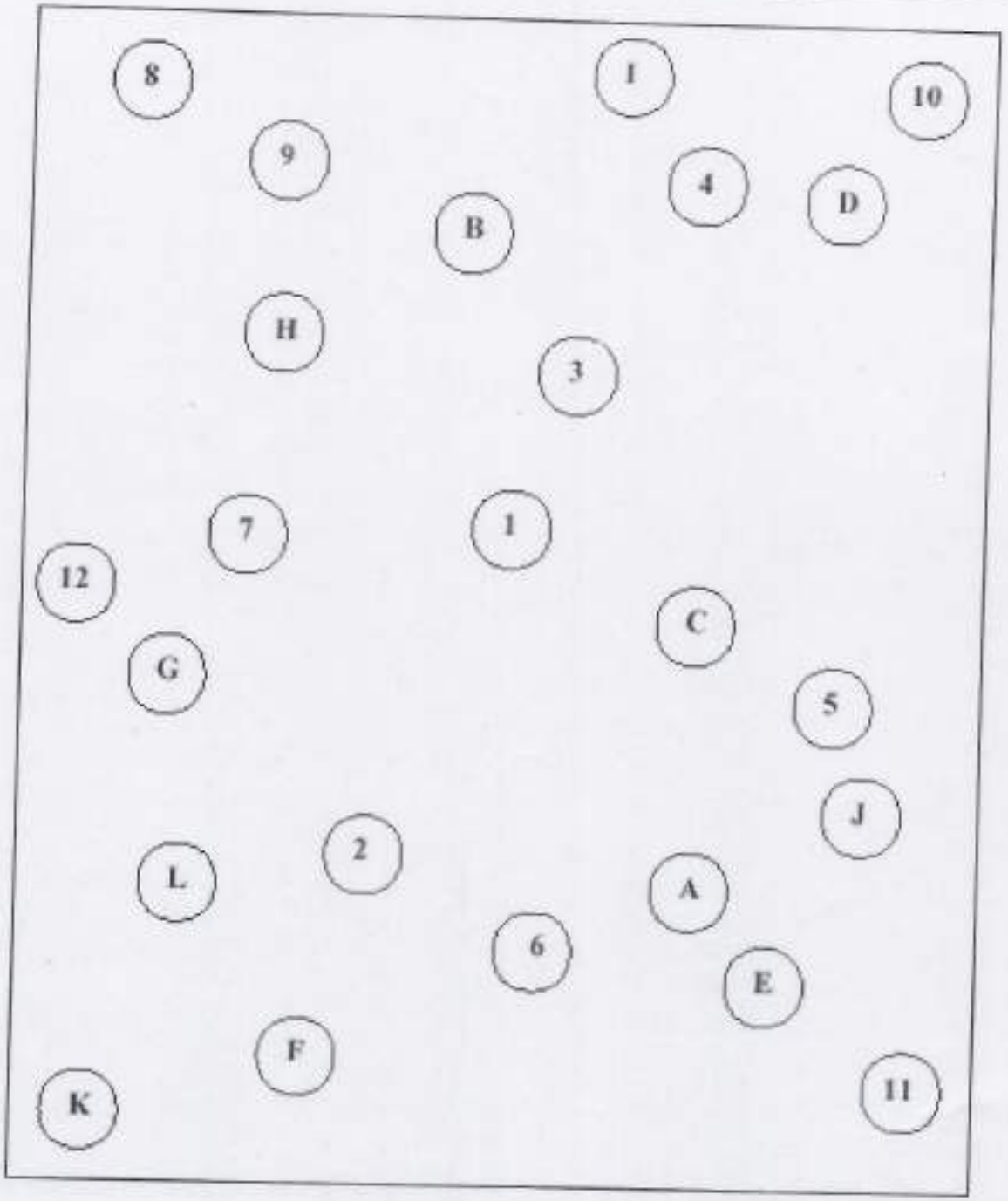


Trail Making Test Part B – *SAMPLE*



Trail Making Test Part B

Patient's Name: _____ Date: _____



IV. Attention and Concentration

1. I am going to say some numbers. Listen them carefully. when I read them, you will repeat them in the same order.

5-7-3		4-1-7	
5-3-8-7		6-1-5-8	
1-6-4-9-5		2-9-7-6-3	
3-4-1-7-9-6		6-1-5-8-3-9	
7-2-5-9-4-8-3		4-7-1-5-3-8-6	
4-7-2-9-1-6-8-5		9-2-8-8-3-1-7-4	

2. I am going to read some numbers but you will be required to repeat them backward. For example, I say 2, 5 you will say 5, 2.

8-5		2-8	
4-3-7		8-5-1	
8-5-6-3		3-7-5-9	
4-7-2-9-1		9-2-5-8-4	
2-5-9-4-8-3		7-1-5-3-9-6	
3-5-8-6-1-9-2		6-3-7-1-4-8-5	
8-5-2-3-6-1-9-4		2-8-4-5-9-7-1-3	

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o.....

.....am willing to participate in the study **"To evaluate and find relationship among executive functioning, coping strategies and clinical correlates in patients with migraine"**. The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

.....

Signature of the Witness

Name:

.....

Signature of the patient

Signature of Candidate

Signature of Supervisor

फार्म अनुमति मरीज

तिथि_____

मैं_____ नीपत/पुत्र/ पुत्री_____ निवासी _____ शोधकार्य इस"To **evaluate and find relationship among executive functioning, coping strategies and clinical correlates in patients with migraine**" मैं हूँ। सहमत लिए के लेने भाग में करता टिपुष् मैं हूँ। तैयार से स्वेच्छा अपनी लिए के लेने भाग में शोधकार्य इस/ यह की हूँ करती है। गया डाला दबाव ही न और गया दिया नहीं प्रलोभन आर्थिक कोई मुझे लिए के देने स्वीकृति यह की है वासविश् यह मुझे और है गया दिया कर टस्पष् देश्यउद् का शोधकार्य इस मुझे में बारे के जोखिम वाले होने में शोधकार्य इस मुझे है। लिए के लाभ के मानवता और विज्ञान है। मामुली बहुत जोखिम यह में समझ मेरी और है गया दिया समझा

तव्यक् अस्वीकृति अपनी समय भी किसी में सम्बन्ध के लेने भाग में शोधकार्य इस मैं सकता कर/ नहीं प्रभाव कोई पर इलाज मेरे का करने तव्यक् अस्वीकृति मेरे और हूँ सकती पड़ेगा।

_____ _____

हस्ताक्षर के गवाह हस्ताक्षर के रोगी/ निशान का अंगूठे

नाम: नाम:

_____

अन्वेषक केहस्ताक्षर

_____

हस्ताक्षर के विद्यार्थी

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫ਼ਾਰਮ

ਮਿਤੀ _____

ਮੈ _____ ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ _____

ਵਾਸੀ _____

"To evaluate and find relationship among executive functioning, coping strategies and clinical correlates in patients with migraine"**ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ।** ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਚੰਗ-ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆਹੈ। ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____
ਗਵਾਹਦੇਹਸਤਾਖਰ

ਮਿਤੀ _____

ਪਤਾ _____

_____
ਮਰੀਜ਼ਦੇਹਸਤਾਖਰ

ਮਿਤੀ _____

ਪਤਾ _____

_____
ਨਿਰੀਖਕਦੇ ਹਸਤਾਖਰ

_____
ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ